

THE NATIONAL SHIPBUILDING RESEARCH PROGRAM

EMPLOYEE INVOLVEMENT AND WORK REDESIGN IN U.S. SHIPBUILDING: ANALYTICAL REVIEW

DEPARTMENT OF TRANSPORTATION
Maritime Administration and

U.S. Navy
in cooperation with
Bethlehem Steel Corporation
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For Mom, Dad, Mags, Kathleen and Frank

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Table of Contents

Acknowledgements	i
Table of Contents	ii
Table of Tables	iii
Executive Summary	iv
1.0 Introduction	1
2.0 Methods and Procedures	4
3.0 The Industry Transformed?	5
3.1 The Traditional Model	5
3.2 From Function to Product Orientation	7
3.3 Employee Involvement Activities	9
3.4 A New Model?	10
4.0 Results	11
4.1 Workplace Redesign	14
4.2 Quality	18
4.3 Reward and Compensation Systems	23
4.4 The Changing Role of Middle Management	29
4.5 Employee Involvement: the Unions' Perspective	32
5.0 Lessons Learned	38

Appendix A Discussants' Comments	41
Appendix B Management Questionnaire	44
Appendix C Union Questionnaire	58
Appendix D Yards Visited	75

List of Tables

1 Historical Development of Industrial Relations Practices in the U.S. Shipbuilding Industry
2 Percentage of the Workforce Involved in Employee Involvement and Work Redesign Activities
3 Number of Innovative Activities in Place Per Yard
4 Frequency of Occurrence of Factors Affecting the Success of Work Redesign Activities
5 Support of Employee Involvement Activities by Management
6 Employee Involvement's Effect on the Unions' Relationship with Management
7 Employee Involvement's Effect on Member Attitudes Toward the Union
8 Effect of Employee Involvement Programs on Union Member Participation
9 Effect of Employee Involvement on the Role of the Union Steward

Executive Summary,

This piece documents the results of a survey of 27 U.S. shipyards engaged in shipbuilding and ship repair in 1986. It focuses on human resource innovations occurring within the yards, especially employee involvement and work redesign activities. A total of 58 management representatives and 18 union representatives responded to the survey questions and personal interviews conducted on site. This resulting document traces the development of traditional human resource practices from their roots in wartime production initiatives and federal policy. Highlighting the inconsistencies between the formality and rigidity of the traditional system and the current demands for industry responsiveness and flexibility, the author notes the movement within the industry toward new production and human resource systems.

The results of the **survey** are then presented. These are broken down by topic area and are summarized here.

Most of the new construction yards had reorganized some part of their production system into zones. Some had taken the zones and organized workers within those zones into small work teams. Some had the same groups of workers assigned to modules in an effort to stabilize the workforce.

- Overall, management support and commitment was deemed the most important element in these types of organizational change.
- While middle managers were often threatened by these changes, not one yard offered them job security.
- Supervisory training was offered (in varying degrees) in most yards before changes were implemented and extensive training positively influenced the permanence of the change.
- Work redesign programs were more often reported to be successful when they were tied to some sort of employee participation program that provided feedback to workers.

This feedback could be provided in the form of performance evaluation or cash bonuses.

- Overall, it was felt that if employees have to take a greater degree of responsibility for their work, they need to be given a forum within which they can influence decision-making that affects their jobs.

Most employee involvement programs resulted in improved quality. The degree of improvement varied as a function of the size of the program.

In order for large-scale quality improvements to occur, training and employee involvement in the process were deemed essential.

The only major changes in compensation programs encountered in the survey were the introduction of gainsharing or profit sharing plans. These plans were quite varied and it was therefore difficult to draw strong conclusions from the generalized findings.

Middle management resistance to change was reported to be a problem in the majority of the yards. There was general disagreement across yards as to what the role the supervisor or middle manager should have in employee involvement activities or organizational restructuring. On the one hand, there was an acknowledgement that managers have unique skills that ought to be used. On the other hand, most yards wanted to 'push' accountability downward, onto the shopfloor and away from management.

In terms of union reaction to employee involvement and work redesign activities, several lessons can be learned from the data.

- Unions rarely reported being worse off because of the implementation of employee involvement activities.
- Employee involvement activities were found to provide a different channel for solving problems on the shopfloor. This creates a potential for these activities to in-

terfere with the normal functioning of the grievance procedure.

- . The implementation of employee involvement activities often coincides with turnover in local union leadership.
- . Local union opposition to employee involvement seems to guarantee that the relationship between management and the union will not change.
- . Inclusion of the local union in the planning and implementation of employee involvement programs is the single most important factor that distinguishes a positive experience for the local from a negative one.
- . The use of collective bargaining in the establishment of employee involvement activities is helpful in making it a joint venture.

Conclusions are then drawn from these diverse findings. The author suggests that a general model appears to be emerging both within this industry and others experimenting with human resource innovations. This model closely links the organization of technology and work processes with the development and full utilization of the workforce. It suggests that without the support of an organizations compensation system, management resources, technology, and overall philosophy, employees will be unable to meet the increased expectations of the changing market conditions. Changing any one of these subsystems may improve organizational performance but it is not sufficient to turn around the industry's competitive position. Drastic organizational change in support of flexibility and competitiveness is required, and even then, only the best yards will survive.

1.0 Introduction

The shipbuilding industry has confronted, and will continue to confront an extremely difficult series of choices. (Industry refers to all segments: management labor and government). What does it take to create a viable future in the wake of shrinking demand for new ship construction, an overabundance of yards, and rapid technological advance? While it is clear that changes are needed to reverse current industry decline, the best direction for innovation to take is as yet unknown. Many of the options open to industry decision-makers require drastic changes in the traditional structure and functioning of social and technical systems, thus introducing additional uncertainty into an already turbulent environment. The only certainty that presents itself to the industry's stakeholders appears to be that, in spite of all attempts to meet the challenges posed by the environment, only the best yards will survive.

Consequently, the demand for additional information on the options available to yards has grown dramatically, as decision-makers attempt to fortify strategies for change with knowledge of the possible ramifications of various innovations.

This report presents the results of a 1986 survey of innovations occurring within U.S. shipyards in the areas of human resources and manufacturing processes. These changes are commonly referred to as employee involvement and work redesign activities. Employee involvement, as the term is used in this report involves the participation of workers in making decisions that directly affect their jobs.

While there are many levels of employee involvement some of the more familiar structures include quality circles, problem-solving teams, and labor-management committees. Work redesign also affects the interface between workers and their work. Organizational pressures for increased quality and flexibility have resulted in a change from function to product orientation. Along with this shift have come innovations on the shopfloor like: zone construction, the use of semi-autonomous small work teams, multi-skilled workers, and a largely stabilized workforce.

This report documents the nature of the economic challenge and the variety of responses chosen to meet that challenge, within the shipbuilding industry and other industries facing similar pressures, in the U.S. and abroad. It begins with a general description of traditional shipyard organization. It then presents the industry's movement in the direction of a new, more flexible organizational design which better meets current economic demands.

This report has been written with the understanding that applied behavioral science is rarely cut and dry. And, in fact, for the person who must contend with the daily reality of the shop floor, the representation of reality with all of its inconsistencies and intervening forces is more appropriate and useful than information on the results of experiments conducted within an artificially controlled environment

This study was funded by the National Shipbuilding Research Program (NSRP). In keeping with

their research agenda, it attempts to tie the experiences of all U.S. shipyards together with relevant academic research and theory, thereby providing the broadest possible base of knowledge for practitioners primarily, and for theorists secondarily. In this respect, the report is meant to contribute to, support, and recognize the research model formally embraced by the NSRP. That model emphasizes practical, applied research conducted within the work environment by members of the organization who will have to live with the research findings. This type of research has been referred to as "action research" because it requires active involvement of organizational members in the identification of research questions, the design of the study, and the implementation of solutions.

The innovative nature of the NSRP and the support it has offered the shipbuilding industry are worthy of note. They provide a useful model of how cooperation between industry, government, and labor can better the competitive status of the industry through research and development. The research findings are shared as are the costs of the studies. The NSRP model is described in more detail below.

The Human Resource Panel of the National Shipbuilding Research Program

The National Shipbuilding Research Program (NSRP) is a cooperative venture of the U.S. Maritime Administration (MarAd), the U.S. Navy and the shipbuilding/ship-repair industry. This joint government-industry program is dedicated to improving productivity of new construction, overhaul, modernization and repair by seeking, developing and implementing new ideas, technologies and equipment in the nation's shipyards. Its objective is to improve the productivity of U.S. shipyards through the financing and management of technical research projects.

The research projects have been funded jointly by MarAd and the Navy at approximately \$4 million per year in recent years. Industry's contribution has been the absorption of project overhead and general and administrative costs.

The NSRP provides for industry participation in the program's technical management through the Ship Production Committee (SPC) of the Society of

Naval Architects and Marine Engineers (SNAME). The SPC is composed of senior technical managers from U.S. shipyards who collaborate with MarAd and the Navy in establishing program priorities, assigning responsibility for projects, and providing technical direction.

Ten technical research panels function under the SPC, each responsible for selecting areas worthy of research and providing guidance and direction to subsequent research projects. The structure of the ten panels is very similar, each having a chairperson, representing the sponsoring shipyard, and a program manager (although, in some cases, these two functions are performed by the same person). The panels' primary purpose is to sponsor research, usually of a technical nature, of immediate import to the U.S. shipbuilding industry.

The Human Resource Innovation Panel (SP5), is the newest of the research panels. It is the only panel with union representatives. The panel's objective is to develop, test and disseminate new management practices and organizational forms which could better tap the productivity potential of the industry's human resources.

Since its inception in 1984, SP5 has grown to embody representatives from 23 shipyards, 13 unions, 2 research centers, the Maritime Administration and the U.S. Navy. Membership is drawn primarily from management (production and industrial relations) and labor union representatives of private and Navy marine construction and marine repair yards.

With their technical shipbuilding backgrounds, panel members have been highly successful at converting organizational theory into usable practical knowledge. This conversion takes place through the sharing of information and experience among the yards (network activities), and by means of the panel's own research program (research activities).

The panel's research program is designed to develop and/or test specific human resource innovations in shipbuilding environments. To that end, most projects are of an "action research" rather than "pure research" bent (i.e., rather than strict adherence to formal experimental design). Following that same logic, the majority of project awards are made directly to yards, the present study being the only exception to date.

Specific research projects for potential panel sponsorship are evaluated and identified on the basis of combinations of elements listed below

- Techniques (employee involvement teams, quality of work life job redesign, gainsharing, etc.)
- Performance (safety, productivity, quality, turnover, absenteeism, etc.)
- Employee Category (skilled trades, middle management, clerical and technical employees)
- Technology Interface (zone construction, statistical quality control, design/production integration, CAD/CAM, etc.)

This study was sponsored by SP5 to identify human resource innovations (employee involvement and work redesign innovations) within U.S. yards. The panel members felt that significant productivity gains had been accomplished through such human resource innovations and that a report documenting the results of various in-house experiences in this area would be of use to all yards, and to the industry as a whole.

Structure of the Report

The remainder of this report is presented in three major sections. In an effort to provide a comprehensive portrait of all aspects of human resource innovation in U.S. shipbuilding, the survey results are combined with historical information, the results of various action research projects, and relevant literature.

The names of the yards have been changed in those cases where it was necessary to protect the confidentiality of the yard. Where possible, actual yard names were used.

After a brief presentation of the methods used to conduct this research, the first section places the shipbuilding industry into its historical context. The second section presents the results of this study. It does so by breaking the findings down into general topics of interest and presenting those findings related to that general area such as reward and compensation plans, union response, etc. Each of these sub-sections consists of an overview of the area, a presentation of the survey results, and some of the lessons learned within the yards. The final section presents general conclusions and lessons learned from this study and points out areas deserving of further study.

2.0 Methods and Procedures

Instrument Development

Two survey instruments were developed to solicit information from union and management respondents regarding the success or failure of employee involvement and work redesign activities. After the instruments were developed, they were sent to a subcommittee of the Human Resource Innovation Panel for critique. It was felt that panel members would be best able to judge for a shipyard environment the relevance of the questions themselves and the appropriateness of the terminology used. Their comments and suggestions were then incorporated into the final survey instruments which were again sent to the panel membership for final approval. The questionnaires that resulted from this process are located in Appendices B and C.

Sampling Technique

A total of 35 yards were asked to participate in this study. The majority of these yards were selected on the basis of their inclusion in the 1984 and 1985 issues of "Report on Survey of U.S. Shipbuilding and Repair Facilities". This document provides an overview of major U.S. shipbuilding and repair facilities primarily to determine if an adequate mobilization base exists for national defense and for use in a national emergency. Additionally, several smaller yards were suggested by panel members on the basis of the yards' involvement in innovative human resource activities. Of the 35 yards solicited, 4 declined to formally participate, 3 were either out of business or going out of business and one was ex-

cluded because of difficulties establishing a convenient schedule for an on-site visit.

The survey data in this study were collected primarily via personal interviews with representatives from 27 yards. At each facility attempts were made to interview representatives from Planning, Production and Labor Relations Departments as well as local union leadership, although willingness and availability to participate varied greatly across yards.

Demographics of the Yards and Respondents

Thus, the survey portion of this study is based on data from 27 yards. Of these yards, over 80% were twenty or more years old. Most of the yards were engaged primarily in ship repair work rather than new construction.

A total of 58 management representatives were interviewed. The number of people interviewed per yard ranged from 1 to 4.

Respondents were primarily middle managers (n=22) or executives (n=15). Five CEOs were interviewed. In terms of their functional areas, the largest number of respondents were affiliated with the Personnel/Industrial Relations Department (n=17), or Production (n=13). The remainder of respondents were from the Planning, Engineering, and Finance Departments. The average tenure of respondents in their immediate positions (not within the shipyard) was 3.2 years.

3.0 The Industry Transformed?

The shipbuilding industry has, at various points in time, been dominated by several different models or styles of shipyard organization. Each of these models involves several important assumptions about the nature of the work being performed. These models and their underlying assumptions are delineated in Table 1, below. Examination of the progression from one model to the next provides im-

portant insights into the overall functioning of the yards.

3.1 The Traditional Model

Prior to the large-scale growth of shipbuilding during the First World War in 1914 skilled craft

Table 1: Historical Development of Industrial Relations Practices

pre WWI	WWI	1918-1938	WWII	post WWII
Craft Model	Mass Production Model	Craft Model	Mass Production Model	Mass Production Model
Individual relations	Collective Bargaining	Individual relations	Collective Bargaining	Collective Bargaining
Piece Rate	Wage Standardization Piece Rate Standardization	Some Company Unions	Wage Standardization	Wage Standardization
Incentive	Employee Representation Org.		Employee Representation Organizations	Unions

workers were used to perform the vast majority of the work. These workers were paid hourly wages. Individual workers and yard supervision negotiated compensation based on a worker's skill level, experience, tenure, etc. Piecerates were commonplace for less skilled workers.

World Wars I and II changed these practices as the Federal Government attempted to reduce the amount of labor pirating (stealing workers) occurring between yards. The federal government imposed several policy changes on the yards from 1916 to 1919 and again in the late 1930's, all of which were targeted at increasing employment stability within the industry. The chosen method for accomplishing this task was wage standardization. A committee of government and industry representatives and the president of the AFL was established in 1916 and again in 1936 to define standard wage levels for each craft and to standardize piece rates. Employee representation organizations were formed within all yards. These organizations had the job of insuring that standardized rates, established at the national level, were applied equitably at the level of the yards.

The passage of the National Labor Relations Act and the Fair Labor Standards Act in the late 1930's, and government policy encouraging the growth of unions during World War II, firmly established unions in the shipbuilding industry. With the growth of unionization came the establishment of collective bargaining, with an emphasis on the negotiation of standard wage scales and strict craft jurisdictions (which differed *from* yard to yard).

Highly detailed and formal labor agreements were bargained and an elaborate grievance procedure was established to handle disputes during the term of contracts. Strict lines of demarcation separated the work belonging to one craft from that belonging to another within or between bargaining units. Workers' incomes were determined by attaching a particular wage rate to each level of skill within a specific craft. Job security was maintained by a set of rules that specified the order in which workers would get laid off (after management decided a layoff was to occur) and how the remaining work would be allocated among the workforce.

This system of work organization can best be understood as an adaptation to the technology and procedures American management had developed for the mass production of standardized goods. These

principles were first applied to the shipbuilding industry during wartime when the assumptions of mass production were valid.

Union and worker support for the establishment of job classifications and contractual rights was sparked by their interest in substituting adherence to established principles and due process as an alternative to managerial caprice and favoritism, prevalent under the craft model prior to World War I. It also stabilized union membership levels, benefiting unions greatly.

The model within the industry since that time had changed little until quite recently. The shipyard has generally become a multi-craft and/or multi-union environment with as many as thirteen individual unions representing members of the workforce within a single yard. Wages have generally been established as a function of the craft, plus some Cost Of Living Adjustment (COLA). Piece rates are far less common than they were before the wars, partially because the wartime wage standardization policy put a cap on the amount that could be earned, thus reducing the incentive to produce above standards.

The recent shift in production techniques within the U.S. shipbuilding industry has changed the underlying principles of shipyard production from individual to group orientation and from function to product orientation. These changes have initiated the evolution of what could be, in fact what has, in some industries, become a new system of labor relations and work organization. This new system relies on the increased participation of employees in the decision-making process and is explained in the following pages.

3.2 From Function to Product Orientation

Early in the 1960's, many companies found that a traditional, functionally structured organization was no longer able to keep pace with increased market demands for flexibility. Increased diversification of products within firms and increased technological change led these firms from functional to product-oriented structures. The shift also affected the structure and organization of human resources within these firms.

Functional organizations group resources into common activities. This form of organization best suits firms which make few products and where the technology is relatively constant. Workers are expected to develop highly specialized skills within their departments. But coordination between departments within an organization is not emphasized. Contact takes place primarily between the parts supplier and the parts user or assembler.

Hierarchy is based on function as well. Workers report to their craft supervisor (or the equivalent) regardless of the particular product or project they are working on. Promotion is based on ability and expertise within one specific area, rather than on the ability to integrate or coordinate across functions.

In the shipbuilding industry, a product-oriented organization, based on a Product Work Breakdown Structure (PWBS) and otherwise known as zone construction, incorporates one or more of the following elements (to varying degrees): stable work teams, multiple skilling, and self-management. Zone construction involves the breakdown of large construction projects into smaller, well defined blocks of work. Construction is oriented around the processes being performed on components. The principle of a zone is that it represents a means of dividing a work package into manageable, trackable blocks (Moen, 1985, pp. 238-239). Thus:

"Zone construction is the utilization of group technology principles by combining various sub-assemblies that have similar tasks and work content -- even though they may look totally different. In other words, the units do not have to be identical at all, as long as they each represent, for example, work for five men of a certain craft mix for two weeks."

In general the movement away from a functional structure and toward a product-orientation amounts to a shift in focus from the type of work being performed to the type of product being created. The shift also requires changing organizational focus from functionally related workers to groups of product related workers.

For many smaller, highly specialized firms, the benefits of the functional approach far outweigh the benefits of product orientation. They do not produce a huge variety of different products. They do not change their basic technology often. And they are rarely able to produce more than a few products at one time.

In the mid-1960's, many shipbuilders in Japan and Europe abandoned functional organizations, adopting **product organizations based** on a PWBS. In contrast, no such revolution occurred in the U.S. shipbuilding industry (a situation which is closely tied to the historical development of the industry discussed in Section 3.1, The Traditional Model).

Elements of the Japanese and European approach to product-oriented workforce are as follows: PWBS units are assembled and/or outtltted by work teams made up of fairly continuously associated employees, functioning in a multi-skilled fashion (each worker has a principle skill, but is also competent and able to perform ancillary tasks). Such teams generally assume some traditional supervisory and staff functions (self-management), thereby arriving at both direct and indirect cost savings. This suggests that teams and zone production are a more cost effective way of mass producing as well as a more cost effective way of flexible manufacturing (See Katz and Sable, 1985).

Thus, while the Japanese shipbuilding industry adapted product orientation to their production needs in the early 1960's, the majority of the U.S. shipbuilding industry did not. American managers generally continued to act on the assumption that a functional orientation best met their needs, an assumption which has in many instances proven invalid. The misconception centers around one's understanding of the term "product". American yards equated "product" with the then common notion of "end product", i.e. a completed ship, rig, etc. It then followed that shipyards, producing relatively few different end products, should operate under a functional structure. The Japanese, on the other hand, succeeded in breaking down the end product into several smaller interim "products", each contributing to the production of one final product but each also considered a final piece of production in its own right.

The entire focus of production in Japanese yards shifted from final product to interim product orientation. The interim products, i.e. parts and tiers of subassemblies were, designed and evaluated as individual products. While sub-assemblies are designed ultimately to serve as parts of larger assemblies, their production is usually evaluated in terms of its cost effectiveness in-house, with the risk that non-cost effective work will be out-sourced. Japanese managers recognized that the extent to

which larger assemblies must be altered to suit the needs of different customers is large. Shipyards were being placed in the position of having to design and produce a "new" product (i.e. a product customized to meet customer specifications) frequently, thereby justifying a product-oriented organizational structure. So they modified their ship design to resemble a collection of interim products. These interim products are referred to as modules.

Modules are functionally related components and connecting parts mounted on a steel frame and completed prior to installation. After completion, modules are joined together to form the end product. Modular construction is very useful for new construction within the shipbuilding industry because it allows workers better access to the parts that they need to work on. Workers are no longer confined by the outer structure of the ship when performing their work. This allows work to proceed much faster and more efficiently. It also allows for greater accountability of departments within a yard and provides a system which lends itself readily to easy tracing of inefficiencies.

Zone and modular construction are often in place together and tend to complement each other. Construction is broken down into logical blocks and then work (the processes to be performed) is subdivided into zones which support the project block at a particular stage of construction.

As the methods of production were transformed in many yards, the structure of the workforce, supervision, and the overall management philosophy of yards had to be adjusted as well. Teams of workers could not be maximally cooperative and cohesive when working together on a project if each member of the team reported to a different craft supervisor. Feedback on the status of a particular module could not be given to the group of workers constructing that module if the management information system continued to analyze productivity and cost effectiveness on the basis of department or craft. Effective product oriented construction depends on support systems which complement rather than run counter to its objectives. Innovations were therefore necessary in all areas of the organization.

A small number of U.S. shipyards began to shift toward a product orientation during the mid-to-late 1970s. Most American shipyards, however, did not become fully aware of the benefits of product orien-

tation until the late 1970's, and were not able to implement the change until the early 1980's at the earliest. Presently, most U.S. yards are attempting to adopt some or all of the pieces which constitute product orientation. Change is slow, however, and integrated change within an organization is difficult to manage. After all, scientific management, which historically has been the basis of shipyard organization, stressed a one dimensional, hierarchical, and bureaucratic management approach and was complemented and reinforced in the United States by the newly forming unions' interest in unambiguous and discrete job classifications for operating strict seniority system (Piore, 1974). The transformation of such a pervasive and well established system is a significant and weighty task. Understandably, few U.S. yards have successfully implemented either PWBS or employee involvement in their entirety. Most yards, however, are gradually moving in this direction.

Many of the innovative changes represent attempts to better integrate the organization of the workforce with the needs of product-oriented construction or modular construction.

Significantly, developments in human resource management have complemented the shift in production techniques in the shipyards. As employees become organized into small work teams and as they are encouraged to expand their skill base, they are also encouraged to share their broadening skills and expertise with other workers and with management. Work redesign provides them with the opportunity to gain more responsibility for performing their work well with less supervision and employee involvement provides them with avenues to change the way work is done. Both activities tend to recognize the value and the potential of members of the workforce.

3.3 Employee Involvement Activities

Employee participation programs, beginning with Quality Circles, gained large-scale popularity in the United States during the 1970's quite distinct from any contact with production-related processes. The first Quality Circles were introduced into U.S.

shipyards in the late 1970's. Since that time, many variations have developed in yards in response to the changing pressures confronting the industry. Generally the changes have resulted in the movement from employee involvement programs to the integration of employee involvement activities within all components of the shipyard environment. These activities have moved away from focusing on the individual worker to a focus on work groups. While all of these changes are significant, the shift from participation as a motivational incentive for workers to a strategy for shipyard survival offers the most fundamental challenge to the industry and to individuals working within the industry. The activities have in some cases reflected and in other cases caused shifts in the production process toward product orientation and modular construction.

One major barrier to change is caused by the introduction of employee involvement programs in **the 1970's and early 1980's as parallel structures**. Parallel structures are structures which function separately and distinctly from the organization at large. They tend to maintain their uniqueness because they are kept apart from the influences of the rest of the organization.

The employee involvement programs of the '70's were highly structured, formalized programs. The strict rules and democratic procedures advocated by many consultants tended to keep EI programs isolated from mainstream organizational culture. Here are a few examples of how and why this happened and what it has cost.

1. Voluntarism

By insisting upon the maintenance of a system with only voluntary participation, organizations commit themselves to the juxtaposition of in-groups and out-groups, or believers and non-believers. Significantly, the level of commitment to voluntarism differs from organization to organization and from one type of EI program to another, with quality circles of the late 1970's leading the "voluntary participation" pack.

2. Decision-Making Structures

Traditional employee involvement programs usually require a formal structure of decision-making that differs from the style practiced by the rest of the organization. Such insistence upon consensus decision-making is not always a huge im-

pediment to EI contagion, but the 5 or 7 steps to problem-solving (depending upon whom you ask) which culminate in consensus decision-making and the strict adherence to democratic principles may not be practical for all organizational situations. The experience of one manufacturing corporation in the Northeastern U.S. offers support for this argument. There, many of the EPGs (Employee Participation Groups) were not willing to sacrifice any degree of democracy to meet organizational needs. This was the case even when the organizational goal was survival, pure and simple. The EI facilitators played a major role in encouraging the EPG participants to hold onto their process regardless of the fact that the time required for the 7 stage problem-solving process was a luxury that they could ill afford.

3. Commitment

Lack of organization-wide commitment is related to the two features mentioned above in that any organizational change that theoretically could be applied to the organization as a whole but is not so applied lacks organization-wide commitment. Parallel structures are often used to pay lip service to processes or structures that are not deemed necessary or practical by the organization as a whole. After all, if the CEO of a firm is absolutely convinced of the merits of employee involvement and participation as a new mode of operating, then it only makes sense that he or she will act upon that conviction rather than relegate it to a boundary area program. Active involvement will mean a day-to-day commitment.

4. Role of the Union

In the shipbuilding cases, the union officials were usually not invited to play a significant role. In order for EI to work throughout an organization, all parties, both labor and management (and the work force), must come to the realization that there is a significant degree of overlap between the interests of the work force and those of the organization. Because of this lack, traditional EI activities have had only a very slight effect on organizational structure and what little effect they have had has come about primarily indirectly (e.g. demonstrating the effectiveness of an alternate approach and hoping that organizational leaders will be persuaded to be more participative on the shop floor.)

3.4 A New Model?

More recently, there has been a change in the reasons organizations decide to implement EI programs and the type of programs they have been establishing. This newer motivation stems from EI's demonstrated effectiveness not only in helping to solve motivational problems of individual employees but also in coming up with solutions to organizational problems (regardless of their source).

The differences between employee involvement of the 70's and that of the 80's are in many ways profound, and reflect the rapidly changing needs of industry in the U.S. today.

These changes will be discussed in more specific terms in the next section. The results of the survey and the interviews with shipyard personnel will form the basis of an analysis of the significance of the changes occurring within the U.S. shipbuilding industry.

4.0 Results

Across the 27 yards surveyed, 61 activities were reported to either presently exist in the yard or to have existed in the past. The breakdown of activities is presented below.

- Quality circles (12)
- Problem solving teams (4)
- “ Safety circles(1)
- Labor-Management committees (6)
- Gainsharing and Profit sharing Plans(4)
- Zone/Modular construction (18)
- Small work teams (3)
- Multi-skilling (7)
- Statistical Process Control(3)
- Self-managing Work Teams(0)
- . None(3)

These figures are somewhat misleading without information on the percentage of shipyard employees participating in the various activities. There is a significant difference between employee involvement activities, which constitute the backbone of labor-management relations within a yard, and those programs which are parallel structures, kept separate from the overall practices of the yard. This difference was highlighted by Chirillo (1982) in his study of engineering departments within shipyards. He found that management attempted to institute outward change without changing other organizational components in support of new engineering structures. The newly designed engineering department was merely appended to the

pre-established organizational structure, culture, etc. The commitment to a new department did not entail permitting the innovation to diffuse into the rest of the organization thereby changing the status quo.

Similarly, Cole (1980) makes the case that until Japanese management practices are adapted to and comprehensively implemented within U.S. firms, they will not be sustained by American industry. Discussing his findings from a survey of 176 firms with quality circles, he states:

“Many of the companies adopting circles came into the process ill-prepared for the change in reward systems and middle management operating style that are necessary for quality circles to take hold and survive...It is our contention...that those companies failing to make such adjustments experience less success with their quality circles activities.” (Cole and Tachiki, 1980)

Therefore, it is important to consider both the percentage of the workforce involved in each and the number of innovative activities in effect per yard. Tables 2 and 3 present those findings.

With these general results in mind and the limitations that they place on the generalizability of the findings (e.g. we can only draw weak conclusions from a yard that has only 5% of its workforce involved in work team.), the more specific results of the survey follow. While this section deals only with the results of the survey, later sections of this report will draw upon the interviews and archival in-

Table 2: Percentage of the Workforce Involved in Activity

	Percentage Involved					
	0-20	21-40	41-60	61-80	81-100	NA
Number of activities	37	5	1	1	13	4

information to discuss more general organizational issues.

The first question put to respondents was, "What type of employee involvement/work redesign activities are currently in effect in your yard?" This question was followed by a series of specific "yes" or "no" questions such as, "Does your yard have quality circles?" The reason for this format was to allow interviewees to identify what employee involvement/work redesign activities meant to them first, and then see if the activities as defined by the interviewee fell into any of the pre-established categories. In this jargon-laden field, this was felt to be a necessary middle step.

Date initiated

Once a respondent had identified an innovative activity, she was asked a series of questions, the first concerning the date that the activity became operational.

Table 3: Number of innovative Activities in Place per Yard

	Number of Activities						
	0	1	2	3	4	5	6
Number of Yards	4	4	6	7	5	1	0

Interest first peaked in the late 1970's and early 1980's when employee involvement and work redesign activities were first becoming widely publicized. Following the initial interest, a steady influx of new activities continued until 1984. In 1984 and 1985, six yards which previously had not experimented with innovative human resource management techniques initiated employee involvement and/or work redesign activities. That is,

of the 20 activities initiated in 1984 or 1985, 14 were initiated by six yards which had no prior experience with employee involvement or work redesign programs. The remainder were initiated by yards that already had some form of innovative human resource activity in place prior to 1984.

Viewing these findings in the context of the economic environment facing U.S. shipyards in the mid-1980's, it is not surprising that more yards were beginning to attend to the benefits of various elements of the product work breakdown structure and employee involvement. Environmental pressures, however, while encouraging innovation, can have a significant effect on the viability of the activities in place. As is discussed in later sections, management and union support is necessary for most human resource innovations to take hold within an organization. Such support must extend beyond viewing change as a necessary evil in order to meet economic challenges.

Stimulus for implementing the Activity

Respondents were asked to name several factors that acted as stimuli for the establishment of employee involvement/work redesign activities. The majority of respondents agreed that economic sur-

vival (28), productivity improvements (27), and foreign and domestic competitiveness (22) were the most significant motivators when yards were considering innovation. The lack of variation demonstrates the pervasiveness of the pressures acting on the industry as a whole.

The next issue concerned the initiation of the idea for innovation. In three cases, the idea for innovation was presented by labor. Management initiated the innovation 55 times. And joint initiation (usually at the bargaining table) took place three times.

Management Support

The question, "Did senior management take an active part in supporting the activity?" followed. On only four occasions did the respondents indicate that senior management was not actively supporting the activity. This may reflect the fact that management is so often the initiator of the activity. Thus, it could be that human resource innovations are not initiated until senior management is quite ready to support them. Two of the yards which did not report senior management support had bargained for gainsharing plans and those yards' experiences are documented at length in Section 4.3, devoted to compensation.

Union Involvement

The question "Was the union involved in designing or implementing the change?" produced surprising results. More often than not, the answer to that question was "No". This was especially true when the innovation was one in production (a work redesign activity). Union involvement was highest when changes in compensation were taking place. Three of the 4 yards with innovative compensation plans involved their union(s) in decisions about compensation in-

novations. Four of the 35 yards with work redesign innovations in place involved their union(s). (Six of yards had no response and 25 yards did not involve their union(s).) And of the yards with employee involvement plans in effect, 10 involved their union(s), 12 did not and 1 yard did not respond.

It is somewhat surprising that union(s) were not involved in the design and implementation of activities purportedly established to involve members of the workforce in the organization and to draw upon their skills. The fact that union officials feared that employee involvement activities were actually being used as union busting techniques is easier to understand in light of these findings on the lack of union involvement in the implementation of such programs and activities.

People with Full-time Responsibility

In response to "How many people have full-time responsibility for this activity?", the majority of yards answered that while at some point in the development of the innovation, at least one person had full-time responsibility for it, that position no longer existed, usually due to financial cuts. The largest number of full-time support for any program was four facilitators, and this was for employee involvement activities at a very large naval yard.

These results provide a very general overview of the number and types of activities encountered within the yards. The following sections of this report examine more closely the activities taking place within the yards. They present the information in more of a case study format and therefore are less standardized. The information is grouped by topic to facilitate organization of the discussion.

4.1 Workplace Redesign

In 1985, as part of a SNAME SP-5 Human Resource Innovation Panel project, a survey was made of the status of product-oriented work groups in European shipyards (Spiegel, 1985). The Purpose of the survey was to learn how European yards use the participation of small work groups to improve their work processes. The factors these yards found necessary for change to occur were

- Strong commitment from top management
- Job protection for supervisors who cooperate
- Supervisor training in work team approach
- Leadership training for supervision
- Opportunity for groups to receive feedback and evaluate performance
- Suggestion program with rewards relative to the suggestion's value.

These factors, where relevant, will provide the criteria for evaluation of the various work redesign activities covered in this report. Table 4 provides an overview of the number of yards meeting each of the conditions mentioned above.

Management Commitment

Of the 19 yards with some form of work redesign activity, only one reported a lack of management commitment to the redesign. Shipyard "G"'s experience with high management commitment is described below and then contrasted with the experience of Shipyard "F".

Yard "G" was rather late in adopting zone construction techniques. Management decided to implement zone construction finally in 1984 because international competition left them "no other choice". According to one respondent, "The Japanese found out how to put a ship together better than we could. We were really too late getting into it." It was hoped that zone construction would enable the yard to meet the goals of: im-

Table 4: Frequency of Occurrence of Factors

Affecting the Success of Work Redesign Activities

N=35

	Yards that Have It (%)	Yards that Do Not (%)	Missing (%)
Management Support and Commitment	94.2	2.9	2.9
Job Protection for Supervisors	0.0	100.0	0.0
Supervisory Training	91.3	5.8	2.9
Feedback for Participants	46.4	37.7	14.5
Suggestion and Reward Program	29.0	58.0	12.9

proved working conditions, improved chance of economic survival, and improved quality.

Units are now built on the ground and assembled into modules. A group of fitters and welders are assigned to each unit. After the unit is completed, another group, usually consisting of electricians and pipefitters, comes in to outfit it. Structural workers usually remain members of the same team until they complete one unit. Management of the work is usually centered on areas within the yard instead of on the disciplines, as was formerly the case.

Management was ultimately pushed into the decision to restructure by international competition, according to one manager interviewed. But they are convinced that they made the correct decision now that the entire workforce is organized according to the principles of zone construction. Management has taken an active role in supporting the structure, and the General Manager has been very vocal in his support. Managers follow upon the progress of zone construction by tracking cost reductions.

e the reorganization of the yard, production has increased and working conditions have improved.

At Yard "F", the switch to zone construction evolved out of the Ishikawajima-Harima Heavy Industries Co., Ltd. (IHD) studies by SNAME. This was the first published report to which the yard had access and, upon learning of II-II's success, they began thinking about how to implement it within their yard. The company felt that such a change would better enable them to meet their goals of: (1) economic survival, (2) improved productivity, (3) international competitiveness, and (4) improved working conditions.

It is unclear how much this innovation cost the yard initially. Several people had to be trained but no account has been kept of total costs. Benefits were measured in the following areas: employee satisfaction, interest, morale, accident rate, and reduction in costs. But these are difficult to calculate in terms of dollar value. One respondent estimated that there had been a 10-30% production cost reduction resulting from the use of zone construction. Another cited reductions in outfitting trades' manhours and reduced damage to materials due to better working conditions.

At this yard, the local unions are basically in favor of zone construction. Management did not allow union leaders to participate in the decision to transform the workplace rather, union officials were notified that the change would take place. Union leaders were invited to attend discussions and meetings with management representatives, because the contract specified that they had to be consulted, but they had no formal power over whether or not the change would take place.

The union officials were skeptical and were initially fearful of losing work but as the change began to happen union people "came back and realized there were cost savings to be gained. They went along with it to see what would happen." One resultant problem for the unions is that now crafts are competing with each other for the skilled work. Low-skill work is not desirable but high skill work is limited.

Currently, approximately 50% of the production workforce is involved in zone construction. But problems have arisen which make further expansion difficult. Top management, after initiating the innovation, failed to take an active role in sup-

porting the structure. Thus, middle managers are having a hard time getting cooperation and support from the design and engineering departments.

This comparison suggests that while top management support is important for getting the innovation introduced into the yard, middle management support is generally what keeps the innovation going after the novelty has worn off. Expansion of these activities is critical especially if one takes a shipyard-wide view of how to make such innovations most effective. The job of integrating the change across organizational levels and across departments falls to those members of the organization closest to the integrated activities. And while it is not unreasonable for top management to delegate responsibility for integration to middle managers, it is less likely to happen if middle management has not been in support of the decision to change.

Job Protection for Supervisors

None of the yards engaged in work redesign activities had formal agreements with their supervisory staff concerning job security. While middle managers were often reportedly threatened by increased participation by shopfloor workers, this research does not address the reason for managers' resistance. But middle management resistance due to the threat of increased workforce participation was reported far more often in response to employee involvement activities than in response to work redesign activities. (See Section 4.4.) It appears that supervisors are less threatened by workers having decision-making authority when the decisions being made are directly related to the workers' particular tasks than when workers are making decisions relating to their shop or department in general.

It is obviously highly desirable to have middle and top management commitment to any sort of organizational change. Failure to gain management support can result in damaging consequences for a planned organizational change.

Related to the issue of management support and commitment, is that of management training. Through training programs, many yards were able to overcome resistance from layers of management.

etc. Not only do they need to learn how to process these types of information, but they also must be guaranteed access to information which formerly was available only to managers. Such changes require new information processing systems, a higher level of trust in the shopfloor workers, and extensive training for both shopfloor workers and supervisors alike.

Suggestion and Reward Programs

Aside from combining work redesign activities with employee involvement structures, none of the work redesign activities in and of itself had a formal system for suggestions. Of the nineteen yards with some form of work redesign activity in place, fifteen had employee involvement structures as well. Not all of the fifteen yards, however, were equally proficient at integrating employee involvement structures with those of work redesign. In fact, as the case studies demonstrate, in most yards the two types of activities had no formal integrating mechanism, as would be the case in a small work team which also constituted a quality circle.

Thus, while small work teams may encourage greater employee participation in decision making due to increased interaction with supervisors and co-workers and increased autonomy, these structures were not tied directly into a forum for having suggestions evaluated and approved.

The implication is that the employees can now make decisions about their work that they could not formerly make. They have the opportunity to make changes that improve the accuracy of their work. But in terms of gaining recognition or financial reward for increasing their performance, the system is lacking.

A problem in evaluating the impact of the lack of a suggestion and reward system in work redesign activities is that many of these activities are relatively new. Thus, the novelty of increased input and influence has not yet worn off. Eventually, the intrinsic reward may not be sufficient

to keep workers interested in checking their work and a reward system may have to be put into place to maintain a high level of performance. In most yards, it is too early to tell if this is the case.

Discussion

Of all of the six conditions delineated at the start of this section, strong commitment from top management appears to be the one most universally recognized by innovative shipyards. The rest of the conditions appear to be more optional than mandatory. Only in those cases where work redesign relied outwardly on increased participation in decision-making by all levels of the workforce did the other conditions come into play, in much the same way that these conditions play a role in employee involvement activities. This is probably due to the fact that, unlike employee involvement activities, work redesign does not have to upset preconceptions of production and supervisory roles. Thus, top management can change the mode of production without having to radically reorganize the power structure. It then becomes middle management's job to implement the change and the production workers' job to live with it. On the other hand if management decides to change production and change the rest of the organizational structure to complement the new system of production, most of the other preconditions become important determinants of the degree of effectiveness of the change.

It becomes clear that, when changing the principles of production, a series of choices exists for decision-makers within organizations. Within this range of choices, organizations must decide how much of a commitment they are willing to make to a new production philosophy. It is possible to use a new production system without having to alter the values of the organization to be consistent with those of the new production system, but it is unlikely that the new system will experience enough support from other organizational subsystems to reach its highest potential effectiveness.

4.2 Quality

One part of the overall shift from a function to a product orientation is the development of an understanding that product quality is positively related to competitiveness. In the past, under a strictly Tayloristic manufacturing system, inspection of parts or products was a separate, specialized function performed by workers whose jobs did not involve the production of good parts, but the detection of bad parts. Bad parts, once identified as such, then had to be reentered into the manufacturing process, usually at a repair bay. These parts were then either scrapped or broken down and rebuilt.

The separation of inspection of products from their production resulted in frequent mistakes and costly repairs. Production errors were increased because (1) employees producing products were not required to inspect their own work and therefore had less information about what errors to look for, (2) employees were being rewarded for quantity, not quality, and (3) there was little direct feedback between inspection and production so employees could continue to produce scrap without knowing that they were doing so.

In shipbuilding, the problem can be even more costly because much of the work performed is not immediately inspected. Due to the small quarters within which all the piping, wiring, and soon had to fit the crafts were sometimes in conflict with each other. Blueprints were imprecise and often left minute but critical details up to the workers performing the job. Unfortunately, because the traditional system made each craft responsible for performing certain tasks, rather than each being responsible for the final product, cooperation between crafts was not encouraged. In fact, reports of one craft tearing down the work of another in order to make room for its wires or piping are not uncommon under this system of work organization.

With the product oriented system of production, however, each function or task is viewed as contributing to the quality of the finished product. Controlling problems where they occur is a major focus of product orientation. The employee involvement movement combined with this new emphasis in production to bring to light the

importance of each individual worker in producing a competitive, competent product. Education and training were taken more seriously. Worker input of ideas and suggestions had to be taken more seriously as well. In fact for the first time in a long time, there has been a burgeoning recognition that workers must be provided with the tools needed to do the job well.

This section focuses on quality. It first presents some general findings from the survey, to provide an overview of the subject matter. Then it covers activities that are most directly related to quality, such as quality circles, statistical process control, and work teams. Finally, it presents the results which speak to the issues of training and employee involvement as they relate to quality.

The survey items which reflected quality improvements were

(1) "What was the stimulus behind instituting this employee involvement (work redesign) activity? (Please rank the top three reasons and simply put "X" by the less important reasons.)"

(2) What were some of the costs and benefits of your employee involvement (work redesign) program?

In response to the first question concerning the stimulus behind instituting employee involvement or work redesign activities, respondents agreed that the promise of economic survival (28 programs), productivity improvements (27 programs), foreign and domestic competitiveness (22 programs) were the primary reasons that yards decided to engage in innovative activities. Quality improvements followed these top three responses, with 15 programs reporting improved quality as a desired outcome of their activity.

Interestingly enough, although respondents were less likely to select quality improvements as a major goal of their employee involvement and work redesign activities, improved quality was often reported as a result of such programs. In those yards where the results of innovations were tracked (approximately 37% of all yards), quality improvements were reported in all but one yard. Of the 9 yards that reported quality improvements, the majority reported significant improvements in those areas affected by the programs. The degree of improvement seems to be related to the percentage of the workforce involved in the employee involvement/ work redesign activity

(The more people involved, the greater the impact.).

Programs and Activities Aimed at Quality Improvements

Among employee involvement and work redesign activities, several almost always have, as one of their primary goals, quality improvement. These are quality circles, statistical process control, and work teams. They are described in detail below, as they relate to quality.

Quality Circles, as the name implies, sometimes relate directly and only to issues of quality on the shopfloor and other times are broadened to include issues such as safety, productivity and morale. They generally consist of 7 to 15 employees from the same work area meeting once a week for 1 or 2 hours to discuss problems on the shopfloor that interfere with their ability to get their work done well. The group selects one problem at a time and researches various possible solutions to the problem. After evaluating the feasibility of all of the solutions and determining the one that best meets their needs, the group usually makes a presentation to a steering committee (consisting of top union and management representatives in unionized settings). In some cases the teams are rewarded if their ideas are approved by the steering committee. In some cases, too, the teams are allowed to participate in the implementation of their solutions. Some organizations hire facilitators to oversee the progress of the quality circles and to train participants while other organizations have supervisors play the role of facilitator. Suffice it to note that quality circle programs vary significantly across organizations. The description provided above is meant only as a general guideline, rather than a definitive statement.

One of the variables which distinguishes one quality circle from another is the degree to which the circles focus on quality issues. Traditionally, when quality circles were developed, they focused the majority of their energy on solving problems which adversely affected the quality of their products. When the circles were assimilated into mainstream American corporations, many firms allowed the circles to concentrate on any problem (from cleanliness of the restrooms to employee exposure to dangerous paint fumes) as long as they

did not interfere with bargaining issues. This liberalized version of quality circles resulted from the interest in quality circles as a vehicle through which employees would gain a sense of importance to the firm rather than as a vehicle through which to improve quality. Good solutions to problems were fringe benefits of the programs but they were often not the primary reason for instituting quality circles. Either way, quality circles focus on quality. In some cases, the focus is quality of working life for employees in other cases, it is strictly product quality.

Consider, for example, the differences between the following quality circle programs, one at a large naval yard and the other two at privately owned, smaller yards. At the naval yard, circles were initiated as a means of improving productivity and quality. Top yard management brought in a consultant to establish 8 pilot circles. The unions agreed to participate on the steering committee by holding two seats out of eight but overall, their attitude was "wait and see". The goal of top management was to have 10% of the workforce involved in the program. This goal was never reached. At the time of the data collection at this yard, only 3.5% of the workforce was involved. This low level of participation was attributed to a lack of management and employee interest and support.

The quality circle program had some positive effects on this naval yard in spite of the lack of participation. The largest of these changes was the personal development of the employees who did choose to participate. Otherwise, little within the yard changed. In terms of meeting overall yard expectations, the quality circle program was only moderately successful.

At Bethlehem Steel's Beaumont yard, an employee involvement program was designed based on the quality circle model but with some important differences. The problems on which the employee involvement teams focused were provided by the steering committee on the basis of a preliminary needs assessment. The initial needs assessment was conducted by an outside consultant through personal interviews with 10% of the workforce. Thus, the steering committee had access to a list of the problems which needed to be addressed, and it could prioritize that list. But the production workforce helped to identify the

organization's problems. Employee involvement teams were then assigned to specific problems by the steering committee on the basis of the closeness of fit between their areas of expertise and the characteristics of the problem.

The process at the yard was brief, lasting only seven months, due to a rapid business down turn. During this short period of time the program generated an estimated annual savings of 125,000 manhours, with a return on investment of over 3:1, in addition to many intangible benefits.

Statistical Process Control (SPC) is another activity targeting quality improvement as a primary outcome. The principles of SPC stress that high quality interim products will increase productivity. These principles, when combined with those of employee involvement, offer the potential for creating a system of decentralized responsibility for the accuracy or quality of the pieces produced.

National Steel and Shipbuilding Co. (NASSCO) experimented with this concept in 1985-86. The Accuracy Control Department was responsible for analyzing work processes and making recommendations for improvement. Their focus was to reduce production manhours by shipping more dimensionally accurate products to follow-on stages of construction through the active involvement and training of the production workforce.

The Accuracy Department worked with production workers to provide them with the skills they needed to measure their productivity. Members of the hourly workforce were trained to check vital dimensions, and work stations were involved in regular data collection for ten months prior to the decentralization of accuracy control within the yard. Eventually, responsibility for collecting data and plotting the data on histograms was handed to the production workforce as well. One highly skilled shipfitter was selected from each main assembly work station to be trained as an Accuracy Control Field Checker. These workers still reported to their foremen, but their first responsibility was to perform vital point checks of the assemblies and to make any necessary corrections. They were also given the task of feeding back the results of their data collection to the members of their work station during meetings at the start of the shift. In-process checking remained the responsibility of each hourly employee.

In this manner, NASSCO was able to pinpoint the origin of recurring problems arriving at erection from earlier stages of construction, and gather data which would lead to the solution of the problem. The result was a large decrease in "percentage defective" after the hourly workers were taught the correct checking procedures and the desired tolerances. Also, a second and third large decrease in "percentage defective" occurred after assignable and common causes of error were removed.

Work Teams also concentrate on quality improvements, although less directly than the two activities mentioned above. Generally, NASSCO felt that self managing work teams were based on the theory that, "social and technical systems need to operate jointly to produce a product in the most efficient manner possible." (SP-5 report) Employees are responsible for their collective output. "The objective of the self-managing work team is to optimize the relationship between the social system of the organization and the technology of the organization to increase the quality of work life, increase output and maintain adaptability to change."

At NASSCO, self-managing work teams were established experimentally in 1985. The teams were to be responsible for making decisions necessary to complete work in their areas, including the planning and scheduling of work to conform to overall schedules, quality assurance, and housekeeping. The traditional role of supervisor was hoped to evolve into one of facilitator and liaison with other parts of the organization. Ultimate authority within each work group remained with the supervisor. Members of the work teams received training in all aspects of production being performed by their team and in basic problem-solving and team building.

Measurable results of this experiment are mixed. While the general goals of increased productivity and improved human relations were met within the work team, there was no control group by which to measure the relative success of this form of work organization. There were also several complicating factors during the course of the experiment that made accurate analysis difficult such as changes in the members of the team, lack of skills training, changes in the supervision, and

not enough active involvement by the work team members in decision making and goal setting.

These findings, when combined with those of the quality circle programs and statistical accuracy control activities above, highlight some of the important preconditions necessary for quality improvement to occur. They are training and employee involvement.

Training and Involvement

The importance of training for employees in activities designed to improve quality cannot be overstated. This is quite simply due to the fact that improved quality requires that all members of the organization take responsibility for the effects of their actions on product quality. Without knowledge of how their actions affect quality, employees cannot contribute to the improvement of the product that they produce. Indirectly too, employees can help to identify problems for which they are not directly responsible and assist in the development of solutions if they are fully trained. NASSCO's statistical accuracy control program demonstrates this point.

At NASSCO, supervisory and hourly workers were trained in the theory and maintenance of Accuracy Control Charts. At first, the hourly workers and foremen at the Fabrication Work Station learned together how to plot data points on the control chart. However, at least one foreman seemed embarrassed that he did not understand, and expressed his discouragement in front of the hourly workers. To eliminate this problem in later training sessions, the foremen were trained prior to the hourly workers.

The hourly employees were trained in checking procedures and in the use of statistical charts. Written checking procedures were provided along with a graph of recent data describing the work station's performance to the design dimensions. Follow-up at the work site during the day assured that the information presented at the beginning of the shift was fully understood. The next step was to encourage input from the hourly workers to identify errors that they did not control. At this time additional training was provided to the hourly workers and foremen in maintaining control charts on a daily basis. This training by the Accuracy Control Department took place in a training room away from the work site. Positive

feedback and recognition from upper management were helpful in building team spirit to encourage continual improvement. This point too cannot be over-emphasized. Commitment from top management has much to do with the willingness to spend money on training programs and new projects. Management and union officials must be well informed on the necessity of the innovation and the need for participants to be fully trained.

As the experience of the naval yard with quality circles demonstrates, innovations need consistent support, usually from an internal champion of the cause. Naval yards have a particularly difficult time with top management support because leadership changes often. New Commanding Officers often want to initiate new programs rather than support a program for which former Commanding Officers receive credit. One respondent from that yard suggested that low morale leads to poor participation in employee involvement programs. He commented, "When you work for the government you are restricted and controlled by this huge bureaucracy. It's not difficult to understand our motivation problem. If you're not interested in doing your work, you sure as hell aren't going to join any quality circle. Whoever said that those things motivate people was dead wrong. They just keep motivated workers motivated."

The NASSCO self-managed work teams also had problems resulting from a lack of management commitment to making the innovation succeed. Although a training matrix and schedule had been developed and agreed upon prior to the implementation of the teams, production pressures often disrupted the schedule and resulted in employees completely missing their opportunity to train in a particular skill. This difficulty was traced back to the orientation of supervision on the table. Although production pressures certainly existed, opportunities also existed for training of employees on the table. These opportunities were often neglected and, as a result the level of multi-skilling and its use on the job at NASSCO did not reach the levels anticipated at the outset of the project.

Bethlehem Steel, Beaumont however, demonstrates the effect of total organizational commitment to change. Aside from the fact that a good deal of time was spent on selecting the outside consulting group and the type of involvement

program that best met the yard's needs, this yard took the time to set program priorities and goals. Training was provided to most members of the organization. This ensured that everyone was aware of the changes taking place and the reasons for the change. It also demonstrates the level of commitment to the change. Time off for training is costly to an organization. But in many cases, exclusion of certain groups from the process can be even more costly in the long run.

It is impossible to ignore the importance of viewing the process of organizational innovation and change as one which requires total commitment. The conceptual framework suggests that the social

design and the design of technology must be in sync with each other. This means, however, that every piece of each of those designs must support the innovation. As the NASSCO experiences point out, training can be a determining variable when it comes to successful adaptation to change. New behavior must be taught and learned by all members of the organization. New compensation and reward structures must reinforce the new behaviors. Union and management officials must be oriented and must demonstrate their support. And all of these features must come together to keep a change from being compromised by the status quo.

4.3 Reward and Compensation Systems

Reward and compensation systems have been changing as apart of the overall shift in organizational practices taking place within the U.S. shipbuilding industry (discussed in previous chapters). Under the traditional union system a worker's income was determinedly attaching a particular wage rate to his/her job and craft. This model is being modified by practices which support a more flexible organization. The shift is significant in that it signifies a new emphasis on employee involvement, and group-oriented work processes.

The shift in production techniques within the U.S. shipbuilding industry changed the underlying principles of shipyard production from individual to group orientation and from process to product orientation. These changes have initiated the evolution of new labor relations practices, one component of which is the development of new compensation practices within yards. The specific innovations which have resulted are discussed at length below. Generally, they fall into three groups: gainsharing plans, profit-sharing plans, and pay for knowledge plans.

Gainsharing

Gainsharing Plans (alternatively referred to as productivity gainsharing plans) are organizational systems for sharing with some or all of the members of the workforce (as well as the stockholders) the benefits of improved productivity, cost reductions, and/or quality in the form of regular cash bonuses. As organizational reward systems they offer people the opportunity to take greater personal responsibility for the success of their organizations, often leading to greater creativity and commitment, and often contributing to productivity and profitability.

Gainsharing is a generic term which refers to the Scanlon Plan, the Rucker Plan, Improshare[®], any number of individual company-developed programs, and even some profit-sharing plans. Under these systems, the productivity of employees is measured using one or more of a large number of available formulas. At the end of a set time period, the employees are paid a bonus if their productivity has exceeded some targeted level. In the shipyards,

this target has often been taken from the yard's estimate on any project. The size of the bonus is a function of the gain realized in actual cost versus the estimated cost and is usually paid as a percent of employee wages or salary.

There are several methods for the calculation and distribution of gains. In industry, generally, the bonus may range from 5% to 15%. However, it is much higher, for short periods of time. Recent plans developed within the shipbuilding industry, however, have been less lucrative or have failed entirely due to the highly competitive nature of the market. Yards have cut quite a bit of slack out of their bids and often bid on certain projects with a wage concession built in. In some cases, the actual bid is lower than the estimate, making it highly unlikely that productivity improvements will enable the yard to pay out bonuses to the workforce.

Although some plans cover only certain groups of employees, such as direct labor, it is more common to see all employees in a factory or company working under a plan. This is believed to encourage cooperation among all groups of employees for the benefit of the organization as a whole.

The general dimensions along which the different plans vary are 1) the degree to which employee-involvement is seen as an integral part of gainsharing, 2) the goals of the plan (what performance is to be improved), and 3) the overall structure of the plan (method of calculation and distribution of gains). These differences are highlighted by the case studies documented below.

Gainsharing plans have been in use within U.S. industries since the 1920's. They have been used primarily as a means of enhancing standard wages for motivational purposes. They are, however, relatively new to the shipbuilding industry, and in all yards visited, gainsharing was proposed to offset the severity of concessionary contracts. The plans have been used to offer workers some hope of making up wages lost due to concessions. They have the potential to do this by sharing productivity gains accomplished when workers make known their ideas for improving yard performance and when they work harder.

It is important to note that the use of gainsharing in a concessionary environment, while not unique to the shipbuilding industry, is not the situation confronting most companies implementing gainsharing plans. There are four categories which distinguish

firms considering gainsharing plans. These are (1) those interested in making compensation contingent on performance, (2) those in financial trouble, (3) those that initiate gainsharing to attempt to balance wage concessions, and (4) successful firms wishing to adopt gainsharing as a part of their management philosophy. Again, all of the gainsharing plans in effect at the shipyards were responses to a concessionary contract, thus falling into the third category.

For instance, Kaiser's Vallejo yard, primarily engaged in new construction, reduced wages for the hourly workforce by \$3.00/hr., bringing them from approximately \$14.00/hr. to \$11.00/hr. on one specific bid, which the yard won. While this was a significant concession for the shipyard employees, management and the union felt that the concession was offset considerably by three factors. First, the union had the opportunity to work with management on the project bids which allowed it access to information on the performance of the yard and the level of profit being built into the bids. This brought the union into the role of partner, thus allowing it to better protect its own interests and those of the workforce. Second the employees would have opportunities to influence the outcome of the decisions made relating to their work through the implementation of an employee involvement program. And finally, the implementation of a gainsharing plan would theoretically enable workers to earn back the \$3.00/hr. or some portion of that by coming in under estimate (i.e. when a job is finished with less labor and materials than included in the estimate). The plan also provided for the sharing of gains in excess of the \$3.00, between company and workers.

Yard "O", on the other hand, is engaged primarily in ship repair work thus, the workforce turnover is very great and the number of projects in the yard is usually around 3 or 4. This makes it difficult and costly to measure gains unless all work on all projects is covered by the gainsharing agreement. Unfortunately, this was not the case. Only naval repair work was covered under gainsharing. Therefore, employees moved from project to project, making evaluation of gains made on one project difficult to match with the workers who contributed to that project.

Several other conditions also play a role in the development and maintenance of a workable gainsharing plan. The fit between the design of the gain-

sharing plan and the organization's goals and structure is important. Specific organizational features important for the design of a gainsharing plan are: organizational size, type of production, management style and labor-management relations, degree of centralization and degree of mechanization (O'Dell, 1981).

Profit Sharing

Important differences exist between gainsharing and profit sharing in a concessionary environment and such plans in a profitable environment. One of the primary differences is the way in which workers will perceive their payments (assuming that payments are earned). Gainsharing within a non-competitive environment in exchange for wage cuts may not be as strong a motivational technique as gainsharing in a non-concessionary environment. Rather than perceiving the additional monies earned as rewards for good performance, employees may feel that this payment is instead lessening the punishment for previous bad performance or, in fact for previous mis-management of the organization.

Profit sharing relies upon total company profits to create a payout. In an industry struggling to become competitive, the likelihood of profit sharing suddenly creating a large enough difference to make workers whole is very small. After all, many factors contribute to the non-competitive status of the firm. And profit sharing without commitment to broader organizational change shifts an unrealistic burden of responsibility onto the workforce. Both profit and gain sharing plans are more likely to be successful mechanisms to reward workers for better work when combined with a structure for employee participation. If the workforce can make a significant impact on profitability, it can only do so when the tools for change are readily available and supported by organizational philosophy. Employee involvement structures can provide these tools for change and are generally built into gainsharing plans.

To the extent that the case specific information is available, these factors will serve as the dimensions along which each of the programs described below will be evaluated.

Organizational Size:

The measure of organizational size used in this study was the number of employees working in the yard. Within the context of all shipyards visited for

this research, yard size ranged from 65 employees at the smallest yard to 30,000 at the largest.

Comparing this with the gainsharing and profit sharing yards, several important differences appear. Within those yards which had gain or profit sharing plans in place, the average yard size was 958 employees. The range went from a low of 450 to a high of 1450 employees. The smaller yards were more likely to adopt a gain or profit sharing plan than the larger yards.

Production Type:

The various types of production in which yards were involved have been grouped into two categories for analysis. Those are ship repair and new construction. The reason for this breakdown is discussed at some length in the methodology section and will not be repeated here. Suffice it to note that these different production types represent very different organizational structures.

Among yards with gain or profit sharing plans, 2 were primarily ship repair facilities and 2 were new construction yards. Of these four yards, the two which were mainly ship repair facilities had a much lower degree of success with their plans.

While the type of production (newbuild v. repair) accounts for some of the variation, not all of the differences can be attributed to production type. The new construction yard had a broader agreement with its union than the repair yard. At Yard "A", one project dominated production; thus, the entire yard was covered essentially by the gainsharing agreement. At Yards "O" and "S", on the other hand, there were several ships coming into the yards for varying degrees of repair, only some of which were covered by the gainsharing agreement. Naval projects at this yard were covered by the gainsharing agreement. Commercial repair work was performed at regular wages with no gainsharing plan in place. Because of this two-tiered system, when both commercial and naval projects were in the yard, employees with high seniority would opt to work on the commercial project. They preferred the guaranteed \$14/hr. wage to the \$11/hr. wage plus potential for improvement through gainsharing. When commercial work ran out, however, senior employees would bump their more junior co-workers off the naval project until more commercial work appeared.

This created two major problems. First the fact that commercial work drew away most of the ex-

perienced workers from naval projects made it very difficult for the workers on the naval project to complete the project under bid, and thereby make gains (and better their \$11/hr. wage). Second, the movement of workers from one project to another and back again made record-keeping for the gainsharing plan extremely costly. Management had to determine who worked on the naval project and for how long and what percentage of the gain each worker was eligible for. Both of these problems served to disrupt the progress of work within the yard.

The new construction yard eliminated the problems associated with employees moving from ship to ship. They had only one project in the yard and this project was entirely covered by the gainsharing agreement. The repair yard, on the other hand, had several projects but their gainsharing agreement only applied to some of those projects.

Another difference is the fact that the new construction yard had an employee involvement structure in place while the repair yard did not. As mentioned in the introduction of this section, employee involvement is another factor deemed important for successful implementation of gain and profit sharing plans. The effects of these differences are difficult to separate from one another.

Management Style and Labor-Management Relations:

Only indirect measures of labor-management relations within the yards were available for analysis. The indicators used were

(1) the occurrence of strikes during or since the last round of negotiations, and (2) joint labor and management involvement in design and implementation of the plan. It is suggested that recent strikes and/or a lack of cooperative implementation of the plan would signify a greater degree of adversarial relationship between labor and management than the reverse of these factors.

Three of the four yards had suffered strikes during or following the last round of negotiations.

In two of the yards the idea for adopting a gain or profit sharing plan emerged from management. One of these yards is a non-union facility and, therefore, hourly workers' involvement was not considered and, possibly, was not practical. In the other yard, management did make a conscious effort to involve the union in all stages of the planning and implementation process. Part of the reason for this was neces-

sity. The gainsharing plan was being put into place in exchange for wage concessions. This agreement could not have been reached without the union. But the union's involvement was taken beyond the negotiating table, and made an integral part of the overall structure of the plan. This is significant.

The other two yards bargained for wage concessions and won them in exchange for gainsharing. That is, gainsharing was the unions' counter proposal to management. In these cases, the plans were far less effective. Management was less prepared to sacrifice autonomy by involving the unions, in my opinion because they were wary of any union proposal. Also, these managers had not researched gainsharing plans and did not generally believe that they were worthwhile ventures. This affected their level of support for the innovation, as is demonstrated below.

Organizational Support:

This variable was measured by responses to the following questions in the following areas: "top management support--union's response--mining".

Again, the four yards were split on their responses to these questions. Two of the four yards, i.e. the two repair yards wherein gainsharing was a union counter-proposal, reported having no senior management support for the innovation. The other two yards reported receiving visible top management and middle management support. This support took several forms, from sending around documents endorsing the change to calling periodic meetings with the entire workforce to keep them up-to-date on the progress of the activity.

In those yards where management supported the activity, some form of orientation or training was offered to workers at all levels of the organization. This was not the case in the other yards. Respondents agreed that these actions were important means of reducing the threat of the change to members of the organization. They served to assure workers that management supported them and felt that the gainsharing or profit sharing plan would benefit both the workforce and the company.

Employee Involvement:

Of the four yards covered in this section, only one had a formal structure for employee participation and information sharing with employees. The following paragraphs describe the employee involve-

ment activities in place at this yard to support their gainsharing plan.

Orientation programs for all employees were offered at the start of this project and continue to be offered for new employees. These sessions take about four hours and attempt to bring employees up to date on the unique management style at the yard. Usually the general manager or the company president is present at these meetings to answer questions and to show support for the innovative structure. The orientation explains the current project in detail and explains the employee involvement philosophy in general.

One essential element of the employee involvement process at Kaiser was the "weekly or otherwise timely disclosure by management of accurate information on job planning, schedules, yard and sub-unit performance against targets, and other relevant operating information (such as tools and materials costs)."

In addition to these activities for shopfloor employees, union officials were included via membership on each of three oversight committees or joint labor-management boards. These were established to ensure commitment from and inclusion of top labor and management officials and consisted of: the Steering Committee, the Yard Committee, and the Design Committee. These committees differed in terms of their responsibilities and their structure. The Steering Committee was composed of eight members and was responsible for the general oversight and functioning of the other committees. The Design Committee was responsible for putting together the gainsharing plan. And the Yard Committee was responsible for coordinating employee involvement efforts in the production areas of the yard. This committee chose a yard manager and appointed yard task forces to examine specific problem areas and propose recommendations for the committees.

Another yard ("Y"), one in which a profit sharing plan was established attempted to informally orient employees to the new compensation plan but had no structure for continued input from employees to top management. Orientation of employees took the following form

One year before initiating the plan, management met with all employees at an annual yard meeting to announce their intention to put a profit sharing plan in place. Over the course of the following year,

management met with individual groups of employees to explain the details of the plan, and how it would effect them. Fliers were handed out to all employees to better explain the underlying principles of profit sharing plans. Employees were encouraged to bring questions to yard managers.

DISCUSSION

One of the major difficulties in evaluating the four plans above is that both theory and practice dictate the need for maintaining flexibility in instituting plans to ensure that the structure of the innovation meets the individual requirements of the organization. Thus, no one formula or implementation strategy is "correct" for all organizations. The general principles outlined at the start of this chapter are helpful as general rules for proper implementation, but should not be viewed as universal truths which will hold across all organizations.

Out of the four cases described above only two actually meet most of the theoretical requirements. These two cases also were described as successful by respondents interviewed. But there are important differences between these plans and the ideal. These differences demonstrate the difficulty in understanding innovation and in understanding what makes innovation successful.

At Kaiser, the stated goals of the innovation were (1) to improve wages, (2) to achieve economic survival, and (3) to improve productivity. Were these goals met? At the time of the interviews, employees had earned back approximately \$0.65/hr. of their \$3.00/hr. concession through significant increases in efficiency and productivity. But they never were able to earn back the entire \$3.00/hr. due, most respondents agree, to some errors in estimates and to a long spell of bad weather. The yard closed shortly after the completion of this project.

In Yard "Y", the stated goals were (1) motivational technique, and (2) a new compensation system. In this situation, it is impossible to assess the achievement of the organizational goals. No measure of motivation was taken. The plan has, however, handsomely rewarded employees for keeping the yard profitable. One possible problem is that, like all organization-wide profit sharing plans, it fails to differentiate between those employees who help to keep the firm profitable and those who do not. Thus, it tends to be less equitable than gainsharing plans.

Also, such a plan forces production employees to pay for inefficiencies or a financial loss over which they may have no control. In some cases, management saw this as being desirable in that employees come to realize how tough the business environment actually is. On the other hand, if the goal of the plan is to motivate employees, then the plan must reinforce improvements in performance even within a highly competitive environment if it is to meet the goal successfully.

The importance of the type of compensation plan in effect should not be underestimated. Compensation decisions reflect significant underlying assumptions of organizational decision-makers such as what behavior should be rewarded, what functions are more valuable than others, what responsibilities an individual's job includes, etc.

The traditional system of wage plus COLA presupposed a stable economic environment. Once that assumption was made, the traditional system could presuppose stability within the skills necessary to perform the work. Rapid technological advances could not be equitably dealt with under this system because seniority was rewarded as opposed to knowledge. Strict craft jurisdictions were expected to result in increased employment levels (by the unions) and increased management control of production processes (by management, according to Tayloristic principles).

Under environmental conditions resulting from the removal of government subsidy of the industry in 1980-1981, these assumptions no longer held true. Organizational responsiveness to market demands became the call of the day. Incentives had to be created which would encourage workers to gain additional skills required to keep pace with rapid technological advances. Within the more competitive environment strict craft jurisdictions meant inefficiency which resulted in the loss of jobs. The craft jurisdictions no longer made sense within the newly emerging production processes which focused on cooperation across functions and group structures on the shopfloor. Without the evolution of incentive mechanisms to address these new developments, the yards would not be able to respond to economic demands.

Profit sharing plans became more popular because management felt that it was time for workers to experience the result of plant performance directly. However, these plans because of their structure, put

the workforce in the position of gaining and/or losing as a function of market forces over which they had little control. While they functioned to keep the work force aware of market conditions, the organization could not implement strategies which would enable the workforce to counter trends extending far beyond the organization's sphere of influence.

Gainsharing plans made sense within the shipyard environment as they made wages directly contingent upon performance of groups of workers. This served the dual purpose of encouraging workers to pool their resources for mutual gain (coordination of functions) and increase their productivity (motivation).

Both types of incentive plans address the new set of market constraints confronting the industry. The need for rapid technological change, highly skilled workers, flexibility in work assignments, coordination across functions, etc., requires a high level of commitment from the workforce. It requires the decentralization of decision-making for rapid response to production problems. It requires giving more autonomy to the workforce in the performance of their assignments. In short it requires a lean organization within which all members are actively

pursuing production goals. This sort of commitment is not likely to develop out of a sense of altruism to the firm. It requires that each individual have a personal stake in the betterment of the firm. Contingency compensation plans such as gainsharing and profit-sharing provide such an incentive.

The principle distinction among various compensation plans is what type of behavior they encourage or motivate a worker to engage in. Under the mass production system of production, organizations were primarily concerned with each individual worker producing the largest quantity of work possible. Organizations were interested in maintaining stability. The fixed hourly wage system provided stability and the piece rate system encouraged rapid production. Under the present system, however, the needs of the organization have changed and the compensation system must also be changed to support or motivate new patterns of behavior. Quality replaces quantity as a focal point of production. Group work processes replace individual centered jobs. And compensation contingent on performance replaces the fixed hourly wage model. Anything less will result in a weaker system.

4.4 The Changing Role of Middle Management

Shipyard employee involvement and work redesign programs and activities varied both in their scope and in their level of integration with other elements of yard operation. In some cases, participation was extended only to supervisory personnel, as at Shipyard "Q" where quality circles were mandatory for middle and lower level managers. In other yards, the supervisory work force was excluded entirely from the actual participation process, as at Shipyard "Y" where the quality circle program is intended for production workers with top management staffing the steering committee. Many yards are represented between each of these extremes. Shipyard "C", for example has a quality circle program in which ideas are solicited from the shopfloor workers, but the actual analysis of the ideas' feasibility and impact of these suggestions is conducted by supervisors and craft foremen. Each variation on this theme of employee involvement presents to the yards a series of choices regarding necessary changes in the role of middle managers, foremen, and supervisors--choices which pose challenges for the shipyard organization and its members. These choices reflect the yards' ability to change their organizational culture along with their changing technological and organizational needs.

Increased employee involvement often conflicts with the traditional responsibilities of middle managers. Changing organizational philosophy toward increased employee involvement requires the development of new roles and organizational structures for middle management. Middle management may perceive the changes in their roles as a direct threat to their power within the organization.

This chapter draws upon the results of the study to show how the challenge is met within shipyards today. Recommendations for dealing with the dilemma are presented.

The Dilemma Today:

Many employee involvement programs in U.S. yards are typified by the experience of Yard "Y" where the quality circle program (or, for that matter, any form of participation) is noteworthy for

the absence of middle management involvement. (see Table 5.) At Yard "Y", the quality circle program started with the development of a steering committee which has since become an advisory committee. This committee consists of six members from upper management. Circles meet once a week for one hour on company time. They decide on the problems they wish to address. They are coordinated and advised by two full-time facilitators. Circle membership is voluntary. If there is enough interest within a shop, volunteers are selected and they are assigned a leader until they complete their training. Then participants elect a leader of their own.

This yard complained of resistance by middle managers and was working on a way to reduce the threat which quality circles posed for middle management when this interview was conducted. It seemed that members of quality circles were being transferred to other departments at a higher rate than other employees, and many circles were having to cease activities due to a decline in membership. Top management was at a loss as to how to deal with the problem.

Middle management resistance to the institution of employee involvement activities was a common complaint across the shipyards represented in this study. Wide top management commitment was reported in all but one of the yards (see chart below), middle management support and involvement was less pervasive and thus, more problematic.

Respondents complained of a lack of support for

Table 5: Support for Employee Involvement Activities by Management

Number of Yards Reporting	Yes	No
Top Management support	(95.7%)	(4.3%)
Middle Management support	(56.2%)	(30.7%)

production worker participation from middle managers. For example, supervisors were not al-

ways willing to let employees off their jobs to attend quality circle meetings. Middle managers criticized quality circles for coming up with unrealistic solutions to insignificant problems. The middle managers were not always interested in employee suggestions. Top managers complained also that middle managers were getting in the way of organizational change. At one yard, for example, when a top manager was asked what would enable the problem solving teams to better meet their goals, he answered that they need to "figure out away to eliminate resistance in the middle management group--they feel threatened--they take the circles' solutions personally."

Generally, the people surveyed felt that employee involvement activities threatened supervisors' and middle managers' sense of security within the yard. A top manager at Yard "W" which had recently done away with their problem-solving teams felt that, "[M]iddle and lower levels of management have to be assured that they will still be useful to the organization. For them, these changes were very threatening. Senior managers had 'personality clashes' with the concept of employee involvement."

Another perspective on why employee involvement activities often resulted in middle management resistance was presented by a top manager at a Yard "P" which had recently abolished its quality circle program. He felt that shopfloor employee involvement activities should be resisted by good managers because Quality Circles led to decreased efficiency. In his view, quality circles are "losers". "They involve going to someone who works with his hands and asking him to solve industrial problems. Production workers end up doing nothing and you pay an awful price...Supervisors are the movers and shakers. They are the resources just waiting to be tapped. Train them. Use them."

This manager believed shopfloor employee involvement targeted the wrong group. It is the job of middle management to ensure that problems get solved on the shopfloor. Production workers lack the education and experience to handle industrial problems. Asking shopfloor workers to address these problems will result in a frustrated workforce and an inefficient organization.

This view is partially supported by the experience of Yard "X" which shifted from

shopfloor quality circles to problem-solving teams directed by supervisors. At this yard, management became frustrated with the quality circle structure. They felt that the circles were difficult to administer. They required a great deal of administrative support, facilitation, meeting rooms, etc. Also, members of a circle tended to lose interest if their ideas were not implemented. Members of the Quality Circles failed to realize that limited resources made some improvements impossible no matter how substantial the payoff might be in the future. Finally, managers at this yard complained that "it takes too long for Quality Circles to get to a problem and solve it."

The experience of this yard tends to support the notion that supervisory personnel are better trained to orchestrate problem solving activities without getting too caught up in the inefficiencies of cumbersome process issues. It is unclear whether this is due, as one manager suggests, to the higher educational level of supervisory personnel, or to their greater experience in dealing with group processes and administration. Either way, it appears that these two yards found the supervisors to be more valuable resources for the solving of production problems than production workers, or at least than production workers who were members of a quality circle program. It could also be due to the more formal structure of the Quality Circles themselves and have nothing to do with the abilities of circle members.

Several important problems concerning the role of the supervisor within U.S. shipyards undertaking employee involvement activities have been presented. First, supervisors tend to be threatened by increasing the level and scope of shopfloor workers' participation in problem-solving and decision-making. They fear that they will no longer be needed by the shipyard organization. They are concerned that once production workers can solve problems, there will no longer be a need for the middle management level of the hierarchy. Secondly, middle managers (and some top management officials) feel that it is inappropriate and inefficient to have production workers engaged in problem-solving activities which management is trained to do. They question the wisdom of duplicating this function, especially when production workers might lack the expertise necessary to solve problems effectively. And

finally, supervisors have a dual role within innovative yards today a role which could put them in a position where they would have to choose between supporting participation efforts or meeting the production goals and bottom line requirements. Faced with such a choice, it is no wonder that the supervisory dilemma has posed such problems for employee involvement activities

Responses to the Dilemma:

Management at Yard "Q" successfully imitated the Japanese approach to quality circles. Management was openly and actively involved in the oversight of the employee involvement activity through a formal system of participation for management. At this yard, the circles discuss problems to tackle, and make presentations of their proposed solutions to their supervisors. The presentation is a formal undertaking at which the circle involved presents to the supervisor(s) the proposed solution's predicted cost savings and cost of implementation. The supervisor must decide within two weeks after a presentation has been made whether or not to implement the solution. If the proposal is accepted, it is the responsibility of the supervisor to implement it.

Supervisors are involved at the stage in the program when proposals are accepted or rejected. This is unique compared to the quality circle programs at the other shipyards studied, where a steering committee is responsible for deciding whether or not to implement a quality circle solution proposal. But it is very similar to the Japanese model. It involves the entire organization in the process. It provides a special and useful role for supervisors that goes beyond the traditional boundaries of their jobs.

This Quality circle program was described by one manager interviewed as "very successful in integrating the needs of supervision with those of the workforce". It is a very large program, compared to others studied, involving over 20% of the workforce.

The creation of supervisory level Quality Circles can help a yard convey to middle managers that

they are valuable resources responsible for creating improvements in the competitive status of the yard. At one yard, supervisory circles were mandatory for all supervisors and middle managers. Implementation of this activity thus required a change in the job design for supervisory workers. In other yards, middle managers were encouraged to take part as participants in shopfloor Quality Circles. Both of these approaches helped to mitigate the conflict inherent in traditional supervisory roles. This was the case at Yard "Q" where top managers decided to institute quality circles at the middle management level only. At Yard "Q", the quality circle groups meet once a week to discuss problems and suggestions from shop floor workers. One such circle consists of the six craft supervisors, the assistant general manager and the production manager. Craft supervisors are expected to solicit suggestions from the workforce and bring them to these meetings.

Suggestion forms are available for hourly employees to have input into the problem solving process. If an employee's suggestion is favorably reviewed by the craft supervisors' Quality Circle, the suggestion is posted on the bulletin board and is printed up in the company's newsletter.

First line supervisors, however, are not invited to participate in the Quality Circle program. As one manager put it, "If they want to get together informally, its fine. Information sharing on innovative activities has to be done on a voluntary basis."

In some yards, middle managers are trained or (more frequently) oriented to accept the concept of employee involvement for production workers and to facilitate the process. They are told what to expect. But inclusion in the process, especially when quality circles are targeted at the production workforce, is rare. In yards surveyed with employee involvement programs in place, respondents reported the need to better integrate the middle manager in the process. Without their support, employee involvement efforts are easily undermined.

4.5 Employee Involvement: the Unions' Perspectives

It is certainly not uncommon to hear employee involvement discussed as a common strategy for everything from motivating employees to saving a failing firm. What is not so common is union involvement in all facets of such an endeavor. When an organized workplace is undertaking initiatives to alter the status quo by increasing the involvement of the workforce, the role of the union can be a variable which has a significant impact on the success or failure of the initiative.

Union officials often perceive employee involvement activities as union avoidance measures. The perception is easily understandable. The increased collaboration between management and production workers could potentially threaten the union's role by undermining the need for representation of employee interests by a third party. After all, the creation of a structure for the presentation of employee concerns and ideas which is incorporated into the overall organizational structure creates a different sort of relationship between production and management employees one which relies less on an adversarial, conflict of interests model and more on cooperation and a recognition of shared concerns.

The union officials surveyed during the course of this study had very definite opinions on the effect employee involvement programs had on the union, the union's relationship with management, union members' attitudes and participation and overall union functioning. The survey used to collect the majority of this information is located in Appendix C. This section draws upon the findings of that sur-

vey to present the effect of employee involvement on the local unions surveyed and the important choices confronting union officials that influence the effects of employee involvement on unions.

Local union officers were asked to describe their local's relationship with shipyard management prior to, and then following, the implementation of employee involvement programs. (See Table 6) This question was asked in an effort to determine whether employee involvement programs would

Table 6: Employee Involvement's Effect on the Unions' Relationship With Management

	Change in Relationship			N/A
	Improved	No Change	Worse	
Overall Relations Between Union and Management	1	3	1	4
Grievance Rate	4	3	1	1
Strike Incidence	1	8	0	0

significantly effect the relationship, and if so, in what direction.

The results are mixed. Table 6 indicates that the implementation of employee involvement activities had no consistent effect on the union's relationship with management. The locals reporting a change in their relationship with management attributed the change to different factors--only some of which had anything to do with employee involvement programs taking place within the yard.

For example, Local #1 experienced a more adversarial relationship with management since the introduction of employee involvement teams. Prior to the implementation of employee involvement teams, the relationship was described as cooperative however, at the time of the interviews with local officials, it had become adversarial. One officer said that the change was due to a change in local leadership rather than due to the implementation of

1 The names of the locals have been changed.

employee involvement teams. These two events, the implementation of employee involvement teams and the election of new local union officers, however, are not necessarily unrelated. In the case of Local #1, the general feeling in the yard was that the union officials who were involved in the implementation of employee involvement teams were guilty of "selling out to management", not specifically in regard to the employee involvement program, but in general. In fact, at the time of the interviews at this yard, the national union along with the leadership of Local #1 had filed a law suit against the shipyard and some of the former officers of the local. The employee involvement program, however, was not blamed for the shift in the union-management relationship.

Local #8 realized a positive change in its relationship with management since the implementation of the yard's quality circle program, although the local opposes the program because it is seen as undermining the shipyard's beneficial suggestion system. But, here again, the change from a "neither cooperative nor adversarial" relationship to a "cooperative" relationship was not attributed to the employee involvement program. The president of local #8 attributed the improvement in relations to the dismal state of the industry, and a change in attitudes on both sides of the table resulting from a change in union officers and management personnel.

This brings up an interesting similarity between both yards reporting a change in union-management relations; ie. the change in union local leadership. An oft-cited reason that union leaders are wary of engaging in labor-management cooperation is that their members will not think that they are doing their job as union leaders. These officials fear that cooperation with management may result in their being voted out of office. The experience of the two locals above seems to support that view. Upon closer examination, however, other common characteristics between these yards could

also be responsible for the change in union leaders. First, both yards were experiencing a downturn in employment at the same time that their employee involvement programs were put into effect. It may have appeared to the workforce that the local agreed to participation in exchange for jobs. Of course, this would not be a popular decision for the local to make, and union members could decide that their jobs should not be bargained away by the union leaders for the chance to participate.

Employee involvement's effect on the grievance rate at the yards surveyed was usually good, or had no effect. Those locals which reported an improvement in their grievance rate following the implementation of employee involvement activities shared the following characteristic all of the locals involved were involved as equal partners in the implementation of employee involvement activities. It is not possible to determine if the involvement of the local officials caused the decrease in grievance rates but it is definitely true that a union local which is hostile to management can easily flood management with grievances as a protest. It therefore, seems likely that at least some of the decrease in

Table 7: Effect on Member Attitudes Toward Union

	Improved	No Change	Worse
Overall Effect	5	3	1
Member/Steward Relations	4	5	0
Identification with Union	3	6	0
Effect on Job Security	3	6	0
Safety and Health	5	3	0
Morale	5	2	1
Job Satisfaction	2	5	1

grievance rate can be attributed to gaining the good

will of the unions and their support for the participation effort.

Employee involvement has little if any effect on strike incidence.

In terms of the effect that employee involvement activities had on union member attitudes toward their union, most locals felt that employee involvement programs improved things. Of the nine locals surveyed, five reported that their members' attitudes toward the union improved (see Table 7).

Outward indices of improved attitudes indicate that in some areas the union is much more likely to benefit from employee involvement activities than in others. For example, union officials reported that in 44% of the locals, union member-steward relations improved, and in 66% they remained the same. Thus, no locals experienced a worsening of steward-member relations as a result of employee involvement programs. Less impressive, however, are responses to the issues of member identification with the union, job security, and job satisfaction. On all of these variables, the majority of locals reported no change.

It is interesting to compare the experience of Local #7 with that of Local #8 in an attempt to better understand where the different results come from. The Local #7 officer felt that the employee involvement program at his yard had a "somewhat negative effect" on worker morale, a "very negative effect" on job satisfaction, and "no effect" on job security *or* safety and health conditions. Local #8's officer, on the other hand reported that the quality circle program at his yard had a "somewhat positive effect" on worker morale, "no effect" on job satisfaction and a "very

positive effect" on both job security and safety and health conditions.

Looking at the general characteristics of these two yards, several important differences appear. Local #7 was not involved in the implementation of the employee involvement program at its yard. Initially, they were non-supportive of the entire process. The employee involvement process ended abruptly after only slightly more than a year in existence. On the other hand, Local #8's experience was very different. Supervisory personnel were involved in the employee involvement process. The union was brought into the implementation process. The steering committee had less formal power, thus encouraging the development of a cooperative

Table 8: Effect Of Employee Involvement Programs On Union Member Participation

	Improved	No Change	Worse
Overall Effect	4	5	--
Member Willingness to Serve on Committees	2	7	--
Member Attendance at Special Meetings	4	5	-.
Member Voting on Ratification	4	5	--
Member Interest in Becoming Committee Member	1	8	--
Member Interest in Running For Office	3	6	-..
Member Voting in Elections	3	6	--
Member Attendance at Regular Meetings	1	8	--
Member Attendance at Social Events	1	8	--

relationship between union, management, and individual workers at the shopfloor level. In short the employee involvement process was better integrated into the overall philosophy of the everyday functioning of the yard. Benefits, therefore, were more readily felt throughout the organization and workers' relationship with the steward, and other issues close to the shopfloor such as safety, improved.

The next set of survey questions dealt with the effect of employee involvement programs on union member participation in the union. Table 8 depicts the responses given by local union officials. It is immediately clear that in the area of member participation in the local, unions lost little or nothing due to the implementation of employee involvement programs. While positive responses are not shared as strongly across Locals as has been the case in Tables 6 and 7, not one local reported itself worse off for having employee involvement programs in the yards. Additionally, Locals #2 and #3 both reported improvement on a majority of indices.

Here, it is interesting to contrast the experience of Local #2, which reported improvement in most areas, with that of #6, which reported no change across the board.

Local #2 was experiencing a slight decrease in employment while #6's employment was growing. This may have affected the degree of participation in the union regardless of the yard's employee involvement program. Workers who fear job loss may become more interested in influencing the union leadership than workers who are not necessarily worried about layoffs.

Also, Local #2's employee involvement program was included in its collective bargaining agreement while Local #6's quality circle program was not. Thus, the employees in Local #2 had first experienced the participation program through their union. They had ratified the contract with employee involvement in it. They, therefore, may be more likely to associate a positive experience with

employee involvement with their union. This is in direct contrast to Local #6 where the local did not take a stand on the employee involvement issue. It was not involved in the implementation of the program. It did not gain contractual language relating to participative programs. It appears less likely that employee involvement will have *any* effect at

Table 9: Effect of Employee involvement on the Role, of the Union Steward

	Improved	No Change	Worse
Overall Effect	2	7	--
Grievance Procedure	--	7	2
Workers' Channels of Communication	5	3	1
Problem-Solving Abilities of Union Representatives	6	3	--
Union Enforcement of Contract	8	1	--
Union Communication with Workforce	4	5	-.

all on that local. It is not the union's program.

The last group of questions asked of the local union officials concerned their perception of the effect of employee involvement activities on the role of the union steward. The more specific areas covered dealt with the effect of employee involvement on the grievance procedure, communication, problem-solving abilities of union representatives, and the union's ability to enforce the contract. Table 9 presents the results.

There seems to be more general agreement across Locals on the effect of employee involvement on these items than on any of the others covered so far. It is clear, at least according to the opinions of those local officials surveyed, that even the best of the

employee involvement programs either interferes with the proper role of the grievance procedure or has no effect on it. Apparently, employee involvement does not strengthen the role of the grievance process, but offers a less conflictive alternative.

Most of the respondents felt that employee involvement programs provided workers with another channel to get their problems solved. At the same time, most respondents felt that the union representatives, as a result of the employee involvement programs, were better able to solve the problems or complaints that workers brought to them. Employee involvement was also felt to be more likely to improve the union's communication with its members than to harm it.

Two locals felt that employee involvement interfered with the proper role of the grievance procedure and one local felt that it undermined the local's ability to enforce the contract. Because of the serious nature of these items, they deserve further attention, even though only a small number of locals reported problems in these areas. Unfortunately, respondents were unable to give clear reasons why employee involvement programs at these yards interfered with these areas. Particularly striking is the fact that while Local #3 reported interference with the grievance procedure, Locals # 2,4, and 5 (at the same yard) did not experience the same problems. Local #7's complaint that employee involvement undermined the ability of the union to enforce the contract may have been due to the implementation of employee involvement groups without bargaining the details. The local may have felt that any suggestions or solutions arising out of the employee involvement process were inappropriate due to the exclusion of the union from the problem-solving process.

Conclusions

Across yards and across topic areas, the union locals were rarely harmed by the implementation of an employee involvement program. The exceptions are in Locals # 1 and 7 where each union reported it was worse off in several respects due to the employee involvement programs. It is unclear why both of these locals suffered under employee involvement programs. In terms of the questions asked in this survey, no common characteristic appears to be able to explain the similarity.

It is important to point out the high level of turnover among local leaders surveyed. Half of the officials were newly elected--after the start of employee involvement programs. It, therefore, seems that the workforce may respond negatively to union officials who advocate cooperation. It seems more likely, however, that the unfortunate coincidence of employee involvement with concessions and layoffs may lead the workforce to question their leaders. Changes in union leadership can be detrimental to the participation effort. The workforce must be helped to understand that layoffs and participation are unrelated--if that is indeed the case.

Generally, employee involvement activities did not affect the union's relationship with management. This was especially true in those yards which did not include the union in the initial stages of implementation of employee involvement activities. It appears that employee involvement programs will have a greater effect on the number of grievances filed and the level of strike activity if the union is committed to making the process work. In fact, union opposition to employee involvement programs seems to be able to guarantee that things will not change between the union and management.

The one overall category most often affected by the establishment of employee involvement programs was "Member Attitudes Toward the Union". The areas most often positively affected within this category are safety and health and worker morale. It is interesting to note, however, that workers' identification with the union and their job security, both elements of the category, were reported almost unanimously to remain the same regardless of employee involvement programs.

Comparing the locals which responded to the survey questions, it becomes apparent that inclusion of the union in the implementation of employee involvement programs is critical. It is the single most important factor that separates a positive experience for the local union from a potentially detrimental one. Further, the use of the collective bargaining process appears to be helpful to the locals. This could be due to the fact that reliance upon the collective bargaining process can be involved. Joint agreement between the union and management also improves the chances that the program will be better integrated into the overall

functioning of the yard because all parties will be committed to having the program work.

5.0 Lessons Learned

The research and preliminary conclusions presented throughout this text form the foundation for a model of shipyard innovation. This model provides an overall context for analysis of the shipyard data. It takes the "snapshots" of individual yards and places them in a broader storyline, taking into account industry-wide trends and characteristics.

As has been demonstrated throughout this document many U.S. shipyards are concluding that they must employ new business strategies if they are to prosper and survive. But, as is also clear from the yards surveyed, the general rules for successful change are difficult to discern.

One important theme that has emerged throughout this research is that in many yards new managerial strategies have been implemented in relative isolation from new operating technologies; decisions concerning the implementation of new technologies have been made without enough understanding of their implications for the organization's social system. The most effective approach seems to be a "total shipyard" approach.

Consider the following summary of findings:

Most of the new construction yards had reorganized some part of their production systems into zones. Some had taken the zones and organized workers within those zones into small work teams. Some had the same groups of workers assigned to modules in an effort to stabilize the workforce.

- Overall, management support and commitment was deemed the most important element

in these types of organizational change.

- While middle managers were often threatened by these changes, only one yard offered them job security.
- Supervisory training was offered (in varying degrees) in most yards before changes were implemented.
- Extensive training positively influenced the permanence of the change.
- Work redesign programs were more often reported to be successful when they were tied to some sort of employee participation program that provided feedback to workers. This feedback could be provided in the form of performance evaluation or cash bonuses.
- Overall, it was felt that if employees have to take a greater degree of responsibility for their work, they need to be given a forum within which they can influence decision-making that affects their jobs.

Most employee involvement programs resulted in improved quality. The degree of improvement varied as a function of the size of the program.

In order for large-scale quality improvements to occur, training and employee involvement in the process were deemed essential.

The only major changes in compensation programs encountered in the survey were the introduction of gainsharing and profit sharing plans. These plans were quite varied and it was, therefore,

difficult to draw strong conclusions from the generalized findings but there was a sense that employee participation forums and work teams best supported the gainsharing approach to contingency compensation.

Middle management resistance to change was reported to be a problem in the majority of the yards. There was general disagreement across yards as to what role the supervisor or middle manager should have in employee involvement activities or organization restructuring. On the one hand, there was an acknowledgement that managers have unique skills that ought to be used. On the other hand, most yards wanted to push accountability downward, onto the shopfloor and away from management.

In terms of union reaction to employee involvement and work redesign activities, several lessons were learned from the yards.

- Unions rarely reported being worse off because of the implementation of employee involvement activities.
- Employee involvement activities were found to provide a different channel for solving problems on the shopfloor. This creates the potential for these activities to interfere with the normal functioning of the grievance procedure.
- The implementation of employee involvement activities often coincides with turnover in local union leadership.
- Local union opposition to employee involvement seems to guarantee that the relationship between management and the union will not change due to the implementation of participatory structures.
- Inclusion of the local union in the planning and implementation of employee involvement programs is the single most important factor that distinguishes a positive experience for the local from a negative one.
- The use of collective bargaining in the establishment of employee involvement activities is helpful in making it a joint venture.

These specific findings suggest that the design of organizations must fit the organization's goals and that all sub-systems within organizations must be congruent with the design of the organization. Because the organization's goals change according to

shifts in the economic environment, the environment too, must be taken into account.

Many of the shipyard innovations were marked by a lack of integration with other features of the environment and a limited willingness among members of organizations to attempt such an integration of a lack of understanding as to why such integration would be necessary. The term "parallel structure" has been used to describe the status of employee involvement and work redesign programs at this stage, indicating the distance inherent in their relationship with the overall functioning of an organization.

Those yards which have a relatively advanced or mature system of employee involvement or work redesign begin to confront the limits of the pre-existing employee involvement or work redesign structures. Organizations not confronting a lot of external pressure could remain at this stage for quite some time. In those cases, employee involvement and work redesign activities were most likely implemented for reasons only indirectly related to gaining a competitive advantage and, therefore, these programs will generally meet their expectations, barring some fairly radical shift in organizational needs.

Conversely, this is a critical time for those organizations which turned to employee involvement and work redesign as a means by which to accomplish fairly radical gains or improvements in efficiency, competitiveness, labor relations, etc. These firms will be forced to recognize the limits of the structures as they currently exist and will have to confront several difficult options. Among these are: disbanding the efforts; leaving the current structures in place as parallel activities and using similar underlying assumptions as those inherent in those structures to launch more integrated, far reaching structure; or modifying the pre-existing structures - to accomplish more significant internal change more rapidly.

In essence, the perfect integration of the social with the technical represents a total redesign of the organization such that every component of operation, management, labor relations and technology incorporates and reinforces the philosophies housed within the social and technical systems, respectively, and personalizes them to the needs of the total organization. The integration of complementary social and technical systems will result in an or-

ganizational dynamic which better meets the needs of both systems. While compromise is most assuredly a major component of the process by which form achieve such integration, the end result would not compromise the potential of either system. It would enhance them. It would take them beyond the reaches of their individual boundaries and introduce them to a system of long-term, fro-reaching efficiency.

Different outcomes in organizational systems can be explained by the variations in the degree of will-

ingness to bring the social and the technical together. In the present case that variable is flexibility.

For all organizations, at any single point in time, there appears to exist an ultimate "best" mix between their social system and their technical system. As has been well documented in other manuscripts, the feasibility of any particular match is a function of many factors such as: labor markets, product markets, technology, business strategies, values, etc.

APPENDIX A

DISCUSSANTS' COMMENTS

Comments submitted by Duane Williams

Productivity Principal, Puget Sound Naval Shipyard,

Bremerton, Washington

At long last we have a comprehensive report comparing shipyards in the area of "Employee Involvement and Work Redesign in U.S. Shipbuilding". This was a herculean effort on the part of the author and she is to be commended on bringing this report to a successful conclusion.

The vast amount of information presented in this report was of great interest to me. The reader could follow, in logical sequence, the steps leading to and the reasons for Employee Involvement and Work Redesign in U.S. Shipbuilding. Of course the Executive Summary and Lessons Learned sections tell it like it is. And the other sections tell why it is like it is.

However, there are two major disappointments in this report for this reader. First, I would have liked to have known the "real" name of all the yards in order to better evaluate what is being successfully accomplished in the "big yards in the sky". (This con-

cern comes from a person at one of those large naval shipyards that must remain anonymous). This reader's second major frustration comes from the fact that no production workers were included in the interviews. (The author has explained the reason for **this** but it still leaves a void in my stomach.) How can we draw the proper conclusions from a report on "employee involvement" if we didn't involve the employees?

It was of great interest to this reader to note that almost all of the shipyards had not included their unions in the planning stages of the employee involvement process work redesign efforts, shame on all of you who didn't.

As we read and reread this far reaching report it becomes more and more apparent that we, the U.S. Shipbuilding Industry, integrate our social and technical systems into one well designed system that will allow us to regain our leadership in the world shipbuilding/repair market (even the generic no name shipyards).

Comments submitted by N. C. Harris

Manager, Shipbuilding Analysis Group

Maritime Administration

As the U.S. shipbuilding and repair industry struggles to survive in the face of intense international competition for a shrinking orderbook, innovative management and organization alternatives are becoming the most viable, cost-effective techniques by which to increase competitive posture. The author is to be commended for providing an excellent summary of those innovations which have recently been instituted in the shipyard labor/management arena.

The new atmosphere of management/union cooperation we see emerging in U.S. shipyards is especially heartening. In its role as the first SNAME panel to have active union membership, Panel SP-5 has fostered open discussions on the multitude of benefits to be gained through increased labor/management cooperation, as well as provided a forum for confronting the real fears and potential pitfalls in this type of employee involvement movement. Similar discussions are presented in this paper and accurately reflect, in aggregate, current shipyard management and labor perspectives.

It is a foregone conclusion that total commitment from upper management is essential to the success of any new shipyard project. What the author has highlighted is the equally essential, but not as apparent requirement for the support of middle management and the union/skilled labor workforce. Each of these groups needs to be involved from the start in any organizational redesign effort in order to give the project a chance for long-term success. The difficulties arise in properly configuring the initiative to individual yard capability and in selling it accurately and fully to the staff responsible for its implementation.

The importance of this paper lies not in the specific case studies it presents, but in the fact that it could be written at all. That there are enough ongoing, relevant activities in this area to create a substantive paper is significant in itself. Everyone involved with the U.S. shipbuilding and repair industry over the last few years has felt the devastating effect of the declining market. Competition has become in-

tense not just in the U.S., but also in Europe and the Far East for every available contract. The industry **knows** that it must become more competitive and productive to survive.

Trends in increased employee involvement and the work redesign efforts covered in this paper illustrate that the innovative spirit of survival is alive in the American workplace. These low-cost alternatives are still the most effective methods available to increase shipyard productivity with a minimum of capital investment. Hopefully, readers will be stimulated to further explore the various options covered in this paper, while keeping in mind the problems encountered by those who have gone before. Through the mutually cooperative efforts of all levels in the workforce, any shipyard can still significantly increase its competitive posture and, in the final analysis, its probability for survival.

Comments submitted by S. F. Sullivan

Human Resources Manager

Bethlehem Steel Corporation

Baltimore Marine Division

Lest anyone question the importance of examining our organizational approaches to plying our trade in the domestic shipbuilding/ship repair industry today, it should be necessary only to note that, of the three shipyards named in this paper, one is now closed and one is about to be. Several of the other yards which participated in the survey find themselves in one of those postures or the other, and few among the rest of us in the private sector can boast that we have not had occasion at least to consider the prospect.

That optimum, utilization of our human resources asset is a condition precedent to profitability and, indeed, survival in today's meager market cannot be gainsaid and need not be elaborated here. What this paper has accomplished is to collect and report the results of the various recent attempts within the industry to achieve such optimization.

The result is what was intended to be a menu of the organizational innovations which have been attempted and the results of each, with suggested

reasons therefor, all presented in the context of the historical development of the industry.

This paper quite capably fills a void which had cried out to be filled and, in doing so, highlights the

need for further and more specific research. My SP-5 colleagues and I are thus challenged to meet that need.

APPENDIX B

MANAGEMENT QUESTIONNAIRE

APPENDIX A

OUTLINE OF GENERAL INFORMATION

We would like to get some background on the nature of the yard and the union-management relationship.

1. What is your position in the yard? (Please describe your duties..)

Position:

- (1) Executive _____
- (2) Manager _____
- (3)** Asst. Manager _____
- (4)** Other _____

Area:

- (1) Human Resource\Industrial Relations _____
- (2) Production _____
- (3) Planning _____
- (4) Finance _____
- (5)** CEO _____
- (6)** Engineering _____

Tenure:

- (1) 5 + years _____
- (2) 1 - **5** years _____
- (3) > 5 years _____

2. How old is the yard? _____

- (1) > 5 years _____
- (2) 5 - 10 years _____
- (3)** 10 - 20 years _____
- (4)** 20 + years _____

3. What type of work is this yard primarily engaged in at this time (eg. new construction, repair work, etc.)

- (1) New Construction _____
- (2) Repair _____

4. How much work does the yard currently have? (Year that the last project is due for delivery.)

- (1) 0 years _____
- (2)** 1 year _____
- (3)** 2 years _____
- (4)** 3 years _____
- (5)** 4 years _____
- (6)** 5 years _____
- (7)** 6 + years _____

5. What is the average turnover time for projects in this yard?

- (1) > 1 month _____
- (2) 1 - 6 months _____
- (3) 6 - 12 months _____
- (4) over 1 year _____

6. Has this yard made any major investment in any form of new technology in the past three years?

- (1) Yes _____
- (2) No _____

7. In the past five years, has employment been:

- (1) _____ Growing
- (2) _____ Remained Stable
- (3) _____ Declining
- (4) _____ Erratic

8. How many employees are currently employed in the yard?

_____ (Both Union and Non-union members, production and administrative staff)

9. What has been the maximum employment level reached in the past 10 years? _____

* * UNIONIZED YARDS -- QUESTIONS 10 THRU 15 APPLY ONLY TO UNIONIZED YARDS. NON-UNION YARDS SKIP TO QUESTION 16.

10. Approximately how many workers are unionized or covered under a bargaining agreement? _____ (Percentage of the workforce)

11. What has been the maximum union membership level reached in the past 10 years? _____ (percentage of the workforce)

12. How many unions represent workers within this yard? (name the unions and the number of workers each represents, please)

13. In your opinion, has management asked for concessions or "give-backs" since or during the last round of negotiations on: (circle response)

If yes, were concessions granted?

a. Wages	Yes	No	Yes	No
b. Fringe Benefits	Yes	No	Yes	No
c. Work Rules	Yes	No	Yes	No
d. Seniority Practices	Yes	No	Yes	No
e. Other Contract Provisions	Yes	No	Yes	No

14. Have there been any major layoffs of union members in the past two years? Yes No

If "yes", about how many members have been laid off? _____
(Percentage)

15. Non-union Members? Yes No

If "Yes", about how many employees have been laid off? _____
(percentage)

16. Have there been any strikes at the yard in the past three years? (1) Yes (2) No

If "Yes", what was the cause of the strike?

How was it resolved? .

17. In general, how would you describe the labor-management atmosphere in this yard in the past three years?

- Does it vary between unions?

- Has it changed recently?

- What do you think is the cause of the current atmosphere?

Employee Involvement Activities:

These are defined for the purpose of this questionnaire as any formal employee participation process used within your yard. Such activities are variously referred to as quality of work life, employee involvement, quality circles, labor-management participation teams, and other names. In this survey, we will use the umbrella term to describe all such activity. If there are any key characteristics of your process that are not covered by these questions, space is provided at the end of the survey for additional comments.

17. What type of employee involvement activities are currently in effect in your yard?

18 A. (Please circle the appropriate response)

- a. -Does your yard have quality circles? YES NO
- b. -Does your yard have problem-solving teams? YES NO
- c. -Does your yard have (a) joint labor-management committee(s)?
YES NO
- d. If "YES", in what areas? (Mark with an "X".)
_____ Plant or department-wide task forces on
product/service quality
_____ Facility design or redesign task forces
_____ New technology task forces
_____ Other (please specify) _____
- e. -Does your yard have safety circles? YES NO
- f. -Does your yard have a suggestion box? YES NO
- g. -Does your yard have a gainsharing program? YES NO
- h. -Does your yard have informal, business related meetings
between employees and management? YES NO
- i. -Does your yard have any other employee involvement
activities? If so, what are they? _____

For each of the employee involvement activities mentioned above, please answer the following set of questions. (Additional copies of these questions will be included for yards which have several employee involvement activities in effect.)

18 B. Type of program implemented: _____

19. The date the activity became operational: _____

20. Was there an initial pilot study? If so, how many workers were involved and what changes were made, if any, before expanding the program? Rough schedule of time spent at each of these stages.

21. Worker participation activities Can have a variety of features. Please describe in your own words the key features of the activity(s) that is(are) in effect in the yard at the present time.

22. Please describe when and how the idea of a participation program first got started. (How was the structure agreed upon?)

23. Idea initiated by: (1) Company (2) Union (3) Jointly
(circle one)

24. What was the stimulus behind instituting EI activities?
(please rank the top three reasons and simply put "x" by the
less important reasons.)

- (01) Economic Survival
- (02) Improve Productivity
- (03) Foreign/Domestic Competition
- (04) Corporate Pressure
- (05) Improve Labor-Management Relations/Employee Relations
- (06) Improve Communications
- (07) Motivational Technique
- (08) Problem-Solving Technique
- (09) New Compensation System
- (10) Improve Wages
- (11) Reduce Turnover
- (12) Improve Quality
- (13) Improve Relationship Between Direct/Indirect Employees
- (14) Company Proposal (union response)
- (15) Improve Working Conditions
- (16) Job Security
- (17) Other (please specify)

25. Has there been any change in these objectives since the
program started? (please explain)

26. How much did this innovation cost the company initially?

How much is it presently costing the company?

How much money, if any do the unions contribute?

How are the benefits of the activity measured?

27. What were the various local unions' responses to the idea of
EI?

28. What percentage of the production and maintenance workers in
the yard are currently involved in the activity?
_____ %

29. Was the union involved in implementing the structure?
If so, how?

30. Has the contractual language changed to reflect the Employee Involvement activities? In what way?

31. Did senior management personnel take an active part in:

a. Implementing the new structure? If so, how?

b. Supporting the new structure? If so, how? (1) Yes (2) No

c. Following up on the progress of the new structure?
If so, how?

32. How many people have full-time responsibility for the participative process? (eg. coordinators, facilitators, trainers, etc.)

(1) None Anymore

(2) 0

(3) 1

(4) 2

(5) 3

(6) 4 +

33. Which, if any of the following special committees or task forces have been established in your facility as part of the participative process?

_____ Plant or department-wide task forces on product/service quality.

_____ Facility design or redesign task forces.

_____ New technology task forces.

_____ Other (Specify, please _____)

34. Which employees have formal meetings on a regular basis to address issues of common concern (such as in a quality circle or other formal problem-solving groups)?

-How were they selected?

35. Were employees trained to participate in the activity?

36. Do the following types of employees receive training in skills and principles relating to the participative process?

	YES	NO
-Top plant management		_____
-Middle management	_____	_____
-First line supervisors	_____	_____
-Local union leaders		_____
-Local union stewards		_____
-Group leaders		_____
-Worker-participants		_____
-Other (specify _____)	_____	

37. Please list any noticable changes brought about by the implementation of this new activity.

38. What, about the structure or functioning of this activity, if anything, should be changed to make it more effective in achieving its goals?

39. Please list and briefly describe any past attempts at Employee Involvement that were either unsuccessful or that faded out of existence.

40. In your opinion, what were the factors that contributed to the failure of the program?

Work Redesign:

Work redesign, for the purposes of this questionnaire refers only to those changes which have resulted in a more flexible, less traditional structure of production. These changes are often agreed to through the collective bargaining process, as is the case with modified work rules or job classifications. Alternately, in yards where a Labor-Management Committee is present, these changes may be agreed upon in a less formal manner. In either case, some examples of more common work redesign activities would include multi-skilling, self management, small work teams, decentralization, and integration of production, planning and engineering.

41. What type of Work Redesign activities are currently in effect in your yard? _____

42 A. (Please circle the appropriate response)

a. -Does your yard have zone or modular construction?
YES NO

b. -Does your yard have small work teams which function as a unit on formally defined projects or tasks?
YES NO

c. -Does your yard try to maintain a stable work force through the use of employment security agreements?
YES NO

-If YES, at what levels of the organization?

d. -Does your yard have multi-skilled workers? (ie. across craftlines) YES NO

e. -Does your yard use shopfloor statistical accuracy control?
YES NO

f. -Does your yard have self-managing work groups which function as a unit on formally defined projects or tasks? YES NO

9 -Does your yard have any elements of work redesign activities as described? If so, what are they?

For each of the work redesign activities mentioned above, please answer the following set of questions. (Additional copies of these questions will be included for yards which have several work redesign activities in effect.)

42 B. Type of change implemented: _____

43. The date the activity became operational:

- (1) Pre - 1980
- (2) 1980
- (3) 1981
- (4) 1982
- (5) 1983
- (6) 1984
- (7) 1985
- (8) 1986

44. Was there an initial pilot study? If so, how many workers were involved and what changes were made, if any, before expanding the program? Rough schedule of time spent at each of these stages.

45. Work redesign activities can have a variety of features. Please describe in your own words the key features of the activity that is in effect in the yard at the present time.

46. Please describe when and how the idea of this particular work redesign activity first got started. (How was the structure agreed upon?)

47. Idea initiated by: (1) Company (2) Union (3) Jointly
(Circle One)

48. What was the stimulus behind instituting this work redesign activity? (please rank the top three reasons and simply put "x" by the less important reasons.)

- (01) Economic Survival
- (02) Improve Productivity
- (03) Foreign/Domestic Competition
- (04) Corporate Pressure
- (05) Improve Labor-Management Relations
- (06) Improve Communications
- (07) Motivational Technique
- (08) Problem-Solving Technique
- (09) New Compensation System
- (10) Improve Wages
- (11) Reduce Turnover
- (12) Improve Quality
- (13) Improve Relationship Between Direct/Indirect Employees
- (14) Company Proposal (union response)
- (15) Improve Working Conditions
- (16) Job Security
- (17) Other (please specify)

49. Has there been any change in these objectives since the program started? (please explain)

50. How much did this innovation cost the company initially?

How much is it presently costing the company?

How much money, if any do the unions contribute?

How are the benefits of the activity measured?

51. What were the various local unions' responses to the idea of work redesign?

52. What percentage of the production and maintenance employees in the yard are currently involved in the activity?

_____ %

53. Was the union involved in implementing the structure?
If so, how?

54. Has the contractual language changed to reflect the Work Redesign Activities? In what way?
55. Did senior management personnel take an active part in:
- a. Implementing the new structure? If so, how?
•
 - b. Supporting the new structure? If so, how? (1) Yes (2) No
 - c. Following up on the progress of the new structure?
If so, how?
56. Please list any noticeable changes brought about by the implementation of this new activity.
57. What, about the structure or functioning of this activity, if anything, should be changed to make it **more effective in achieving its goals**?
58. Please list and briefly describe any past attempts at Work Redesign that were either unsuccessful or that faded out of existence.
59. In your opinion, what were the factors that contributed to the failure of the program?

OUTLINE OF ECONOMIC INFORMATION

Note: This outline provides variables for the analysis of the outcomes of the EI/work redesign programs

This section concerns the costs and benefits of EI and work redesign activities within the yard. As each yard may have its own method(s) of measuring the effects of these activities, no set formula for cost/benefit analyses is provided. Instead we ask that you briefly summarize below the methods which your yard has used (if any) to measure the performance of EI/work redesign activities. And then, the findings of your analyses.

In general, some of the areas you may wish to address include:

- I. Output and Costs
- II. Productivity (before/after innovation)
- III. Technology (equipment)
- IV. Employment Changes
- V. Quality
- VI. Unexcused Absenteeism, Voluntary Turnover, Tardiness, and Grievance Activity
- VII. Other

APPENDIX C

UNION QUESTIONNAIRE

Appendix B

QUESTIONNAIRE FOR LOCAL UNION LEADERS

A. Background Information

We would like to get some background on the union, the shipyard and the union-management relationship.

1. What is your position in the union local? _____.
 2. How many employees are currently employed in the yard?
_____.
 3. How many of the employees in the yard are covered by the collective bargaining agreement between your union and the yard?
_____.
 4. What percentage of those employees covered under the collective bargaining agreement between **your union and the** yard are members of your union?
_____.
 5. Did management ask for concessions in the last contract negotiations on : (circle response)

	If yes, were concessions granted?			
a.Wages	yes	no	yes	no
b.Fringe Benefits	yes	no	yes	no
c.Work Rules	yes	no	yes	no
d.Seniority Practices	yes	no	yes	no
e.Other contract provisions	yes	no	yes	no
 6. Did the last contract negotiations result in a strike?
yes no
 7. Have there been any major lay-offs of members of Your union since the last contract negotiations?
yes no
- If yes, how many members have been laid off? _____

B. Information on Employee Involvement Program

Employee involvement activities are defined for the purpose of this questionnnaire aa any formal **employee participation** process used within the _____ shipyard. Such activities

8. What was the stimulus behind instituting employee involvement activities? (please rank the top three reasons and simply put an "x" by the less important reasons)

- a. ____ Economic survival
- b. ____ Improve productivity
- c. ____ Foreign/Domestic competition
- d. ____ Corporate pressure
- e. ____ Improve labor-management relations
- f. ____ Improve communications
- g. ____ Motivational technique
- h. ____ Problem-solving technique
- i. ____ New compensation system
- j. ____ Improve wages
- k. ____ Reduce turnover
- l. ____ Improve quality
- m. ____ Improve relationship between direct/indirect employees
- n. ____ Company proposal (union response)
- o. ____ Improve working conditions
- p. ____ Job security
- q. ____ No response/NA

9. Has there been any change in these objectives since the program started? (please explain)

10. What was your union's Initial reaction to the the idea of an Employee involvement program?

very supportive	supportive	Neither supportive nor nonsupportive	nonsupportive	very nonsup- portive
--------------------	------------	---	---------------	----------------------------

11. What were the reactions of the other unions in the yard to the idea of an employee involvement program?

very supportive	supportive	Neither supportive nor nonsupportive	nonsupportive	very nonsup- portive
--------------------	------------	---	---------------	----------------------------

12. What percentage of the members in your union, who work in the yard, are currently involved in the EI program? _____

13. What percentage of the members of the other unions in the yard are currently involved in the EI program? _____

14. What percentage of the total labor force in the yard is involved in the EI program? _____

15. Was your union involved in implementing the EI structure?
yes no

If yes how?

16. Does the current collective bargaining agreement contain a provision for the EI program?
yes no

(If yes, can we get a copy of the provision?)

17. Has the EI program resulted in any work rule changes?
yes no

If yes, what type?

C. Effect EI Programs have on the Local Union

1. Employee involvement programs can have positive, negative, or no effect on a number of issues at the workplace. In your view, what has been the effects of the program in this yard on the following issues?

a. worker morale

very negative effect	somewhat negative effect	no effect	somewhat positive effect	very positive effect
----------------------------	--------------------------------	-----------	--------------------------------	----------------------------

b. job satisfaction

very negative effect	somewhat negative effect	no effect	somewhat positive effect	very positive effect
----------------------------	--------------------------------	-----------	--------------------------------	----------------------------

c. member-steward relations

very negative effect	somewhat negative effect	no effect	somewhat positive effect	very positive effect
----------------------------	--------------------------------	-----------	--------------------------------	----------------------------

d. member satisfaction with the union

very negative effect	somewhat negative effect	no effect	somewhat positive effect	very positive effect
----------------------------	--------------------------------	-----------	--------------------------------	----------------------------

e. job security

very negative effect	somewhat negative effect	no effect	somewhat positive effect	very positive effect
----------------------------	--------------------------------	-----------	--------------------------------	----------------------------

f. grievance rate

very negative effect	somewhat negative effect	no effect	somewhat positive effect	very positive effect
----------------------------	--------------------------------	-----------	--------------------------------	----------------------------

g. safety and health conditions

very negative effect	somewhat negative effect	no effect	somewhat positive effect	very positive effect
----------------------------	--------------------------------	-----------	--------------------------------	----------------------------

h. union member-union officer relationship

very negative effect	somewhat negative effect	no effect	somewhat positive effect	very positive effect
----------------------------	--------------------------------	-----------	--------------------------------	----------------------------

i. membership identification with the union

very negative effect	somewhat negative effect	no effect	somewhat positive effect	very positive effect
----------------------------	--------------------------------	-----------	--------------------------------	----------------------------

j. ability to resolve grievances informally or at early steps of the grievance procedure.

very negative effect	somewhat negative effect	no effect	somewhat positive effect	very positive effect
----------------------------	--------------------------------	-----------	--------------------------------	----------------------------

2. Have EI committees or groups discussed issues that, are covered by the work rules or practices provision of the collective bargaining agreement?
- yes no
If yes, to what extent?

3. We are interested in whether the EI program has had any effects on the internal functioning of the local union. In your view, has the program resulted in any increase, decrease or had no effect on the following: (response categories: increased greatly; increased; had no effect; decreased; decreased greatly)

a. willingness of members to serve on union committees

increased greatly	increased slightly	no	had effect	decreased slightly	decreased greatly
----------------------	-----------------------	----	---------------	-----------------------	----------------------

b. Interest in becoming a union shop committeeperson

increased greatly	increased slightly	no	had effect	decreased slightly	decreased greatly
----------------------	-----------------------	----	---------------	-----------------------	----------------------

c. Interest in running for union office

increased greatly	increased slightly	no	had effect	decreased slightly	decreased greatly
----------------------	-----------------------	----	---------------	-----------------------	----------------------

d. Membership attendance at regular union meetings

increased greatly	increased slightly	no	had effect	decreased slightly	decreased greatly
----------------------	-----------------------	----	---------------	-----------------------	----------------------

e. Membership attendance at special union meetings

increased greatly	increased slightly	no	had effect	decreased slightly	decreased greatly
----------------------	-----------------------	----	---------------	-----------------------	----------------------

f. Membership attendance at social events sponsored by the union (picnics, X-mas parties, etc.)

increased greatly	increased slightly	no	had effect	decreased slightly	decreased greatly
----------------------	-----------------------	----	---------------	-----------------------	----------------------

g. Membership voting in union elections

increased greatly	increased slightly	no	had effect	decreased slightly	decreased greatly
----------------------	-----------------------	----	---------------	-----------------------	----------------------

h. Membership voting in contract ratification elections

increased greatly	increased slightly	no	had effect	decreased slightly	decreased greatly
----------------------	-----------------------	----	---------------	-----------------------	----------------------

4. Below are listed a number of things that some people believe an employee involvement process might do to the job of a union representative or shop committee member. We would like your opinion. To what extent do YOU agree that the employee involvement process has:

a. Interfered with the proper role of the grievance procedure.

strongly			Neither		Strongly
agree	agree		Agree nor	Disagree	Disagree
			Disagree		

b. Given workers another channel to get their problems solved.

strongly			Neither		Strongly
agree	agree		Agree nor	Disagree	Disagree
			Disagree		

c. Improved the ability of union representatives to solve problems or complaints workers bring to them.

strongly			Neither		Strongly
agree	agree		Agree nor	Disagree	Disagree
			Disagree		

d. Undermined the union's ability to enforce the contract.

strongly			Neither		Strongly
agree	agree		Agree nor	Disagree	Disagree
			Disagree		

e. Improved the union's communications with its members.

strongly			Neither		Strongly
agree	agree		Agree nor	Disagree	Disagree
			Disagree		

5. What effect, if any, has the employee involvement process has on the role of local union representatives (stewards, business agents, etc.)

increased	increased	had	decreased	decreased
greatly	slightly	no effect	slightly	greatly

If there has been a change in the role of union representatives please explain! _____

6. Overall, what effect do you think the EI process will have on the union in your yard?

definitely strengthen	probably strengthen	no effect	probably weaken	definitely weaken
--------------------------	------------------------	--------------	--------------------	----------------------

D. WORK REDESIGN

Work redesign, for the purpose of this questionnaire refers only to those changes which have resulted in a more flexible, less traditional structure of production. These changes are often agreed to through the collective bargaining process, as is the case with modified work rules or job classifications. In yards where a Labor-Management Committee is present, these changes may be agreed upon in a less formal manner. In either case, some examples of more common work redesign activities include multi-skilling, self-management, small work teams, decentralization and integration of production, planning and engineering.

1. Are there any work redesign activities currently in effect in your yard? yes no

2. were there any past attempts at work redesign that were either unsuccessful or faded out of existence? yes no
If yes, please describe the employee involvement activities that occurred _____

In your opinion what were the factors that contributed to the failure of the programs?

IF RESPONDENT DOES NOT ANSWER YES TO BOTH QUESTION 1 & 2 IN THIS SECTION OF THE QUESTIONNAIRE THE INTERVIEW IS FINISHED.

3. What type of Work Redesign activities are currently in effect in the yard? _____

a. Does the yard have zone construction? yes no

- b. Does the yard have small work teams which function as a unit on formally defined projects or tasks? yes no
- c. Does the yard have a stable work force? yes no
- d. Does the yard have multi-skilled workers? yes no
(i.e. across craftlines)
- e. Does the yard use shopfloor statistical accuracy control? yes no
- f. Does the yard have self-managing work groups which function , as a unit on formally defined projects or tasks? yes no
- g. Does the yard have any elements of work redesign activities as described above? yes no
If yes, what are they? _____

For each of the work redesign activities mentioned above, please answer the following set of questions. (additional copies of the following questions will be included for yards which have several work redesign activities in effect)

3. Type of change implemented: _____
4. The date the activity became operationalized: _____
7. Was there an initial pilot study? yes no
If yes:
a. how many members of your union were involved? _____
b. where any changes made before expanding the program? yes no
If yes, what changes *were* made? _____

6. Work re-design activities can have a variety of features. please describe in your own words the key features of the activity that is in effect in the yard at the present time.

7. Please describe when and how the idea of this particular work redesign activity first got started?

8. Who initiated the idea of the work re-design activity?

Company

Union

9. How was the structure agreed upon?

10. What was the stimulus behind instituting the work re-design activity? (please rank the top three reasons and simply put an "x" by the less important reasons)

- a. ____ Economic survival
- b. ____ Improve productivity
- c. ____ Foreign\Domestic competition
- d. ____ Corporate pressure
- e. ____ Improve labor-management **relations**
- f. ____ Improve communications
- g. ____ Motivational technique
- h. ____ Problem-solving technique

- i. _____ New compensation system
- j. _____ Improve wages
- k. _____ Reduce turnover
- l. _____ Improve quality
- m. _____ Improve relationship between direct/indirect employees
- n. _____ Company proposal (union response)
- o. _____ Improve working conditions
- p. _____ Job security
- q. _____ No response/NA

11. Has there been any change in these objectives since the program started? (please explain)

12. What was your union's Initial reaction to the the idea of work redesign?

very supportive	supportive	Neither supportive nor nonsupportive	nonsupportive	very nonsup- portive
--------------------	------------	---	---------------	----------------------------

13. What were the reactions of the other unions in the yard to the idea of work re-design?

very supportive	supportive	Neither supportive nor nonsupportive	nonsupportive	very nonsup- portive
--------------------	------------	---	---------------	----------------------------

14. What percentage of the members in your union, who work in the yard, are currently involved in the activity? _____
15. What percentage of the members of the other unions in the yard are currently involved in the activity? _____
16. What percentage of the total labor force in the yard is involved in the activity? _____
15. Was your union involved in implementing the structure?
yes no

If yes how?

16. Please list any noticeable changes brought about by the implementation of this new activity?

17. What about the structure of this activity, if anything, should be changed to make it more effective in achieving its goals?

18. Which of the following best describes the role that your union actually **plays** in the program at the present time?
- a. _____ The union strongly opposes the program and discourages member participation
 - b. _____ The union opposes the program but neither encourages nor discourages member participation
 - c. _____ The union is neutral toward the program
 - d. _____ The union supports the program but leaves it to management to run it
 - e. _____ The union supports the program and actively participates in running it with management

19. In your estimation, what percentage of each of the following groups believe the program is a good idea?

- a. _____ Rank and file members
- b. _____ Stewards
- c. _____ Members of the Local Executive Board

APPENDIX D

YARDS VISITED

Shipyards Visited¹

Alabama Drydock and Shipbuilding Corporation

Bath Iron Works

Bay Shipbuilding Corporation

Bethlehem Steel Corporation

Beaumont, Texas

Sparrows Point, Maryland

Dillingham Ship Repair

General Dynamics Corporation, Electric Boat Division

Quonset Point, Massachusetts

Groton, Connecticut

Gunderson, Inc.

Ingalls Shipbuilding

Jacksonville Shipyards, Inc.

Kaiser Steel Corporation, Fabricated Products Group

Lockheed Shipbuilding and Construction Company

Marathon LeTourneau

National Steel and Shipbuilding Company

Newport News Shipbuilding

Norfolk Naval Shipyards

Norfolk Shipbuilding and Drydock Corporation

Northwest Marine Ship Repair

¹ One yard asked that it remain unidentified.

Peterson Builders Inc.

Philadelphia Naval Shipyard

Puget Sound Naval Shipyard

Tacoma Boatbuilding Company

Todd Pacific Shipyards Inc.

Seattle, Washington

San Francisco, California

San Pedro, California